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The Management of Prostatic Carcinoma

H. WILLARD STERRETT, M.S., D.O., F.A.C.O.S.

Philadelphia

One of the most difficult problems the general practitioner has is the recognition and treatment of prostatic cancer. The general practitioner is mentioned because he is, as a rule, the first one who sees the patient with this condition. The surgeon is responsible also, for unless he follows accepted lines, much that might be done for the victim thus affected is neglected.

The frequency with which carcinoma of the prostate occurs presents the urologist with a most baffling and discouraging problem. This frequency is shown by many reports. Rich, in 292 autopsies on men over 50 years of age who were seen at Johns Hopkins, found carcinoma in 14 per cent, and in 68 per cent of such cases the tumor had not been discovered because it was too small to produce symptoms. Young, in 1935, revealed the fact that one fifth of all male patients who sought relief of obstruction at the vesical neck had carcinoma. This has been confirmed in numerous autopsy reports. In my own experience, cases operated on for supposedly benign hypertrophy exhibited an incidence of cancer in 23 per cent of the cases. Such carcinomata were well walled off in the center of the gland.

It is not only the frequency, but also the deadliness of it that intrigues us. Many urologists of experience have stated that they doubt the cure of any case by any known method. According to Hinman, no one has cured a patient by radium or x-ray, and the majority of urologists, in his opinion, direct their efforts to the "postponement of death." Only a very few can give proof that early diagnosis and radical removal will cure. However, until the actual cause is known and specific treatment is available, it would appear that radical removal is our only hope. This, however, is rarely applicable, for usually when the surgeon sees the patient the carcinoma has already spread beyond hope of complete removal. If every practitioner would realize this fact and the gloomy outlook for the victim, more doctors would make routine examinations of the prostate in all males over 40 years of age, and thus would discover by palpation some of the early changes. It would cause them to put into practice more technical methods of diagnosis, with the result that many cases would be saved which are now lost.

We do not know the cause of carcinoma. Ewing has stated that chronic hypertrophy is probably the chief predisposing factor. Moore found malignancy intimately associated with senile atrophy and believed that in the vast majority of cases prostatic cancer results from stimulation and autonomous proliferation of epithelium which has already undergone atrophy. Be that as it may, a large per cent of cases are associated with benign hypertrophy.

Age incidence of carcinoma tells us nothing about the actual age at which the disease begins, though its manifestations are rare in patients under 40. Probably for a long time prostatic cancer is entirely symptomless, and when signs do arise they are too often taken as a matter of course. One can get a general idea of the rapidity of its progress by analyzing the period of survival after the onset of such symptoms. Deming, reporting for Hugh Young, in a series of 100 cases, stated that forty-eight patients were dead within 2½ years after the beginning of symptoms. Bumpus found the survival period to average 2.73 years. Even after symptoms do begin, the patient all too frequently waits a long time before consulting a physician. From the standpoint of cure, it is too bad that the disease does not immediately make itself known by pain, as this probably would bring the patient to the doctor much more quickly.

It should now be obvious that in all patients over 40 years of age, the prostate should be very thoroughly examined. There should be a careful chemical and microscopic examination of voided urine, and a catheter should be employed to determine the amount of residual urine. Following this, the rectal examination is made, and in doing this the physician should bear in mind (1) that cancer most frequently develops in the posterior portion in the lamella of a benign hypertrophy; (2) that this hypertrophy may well obscure the presence of the cancer, particularly if the latter is surrounded by nodules of benign growth—or if the lesion develops in the thin layer of this posterior lamella confusion may arise because of the elasticity of the hypertrophied tissue behind it; and, (3) that the growth may form only a hard nodule in some portion other than the posterior lobe. In any event, in a case of typical prostatic carcinoma there is usually an induration of the intervesicular notch. One should also palpate the urethra distal to the apex of the prostate to determine whether or not the membranous portion is involved. When this occurs, the part of the urethra just beneath the pubic arch appears somewhat broader, hard and thick. Often, in the palpation of the groove between the two lobes, one can facilitate the examination by inserting a sound and turning the beak backward in order to palpate the intervening structure. Young states that one should examine carefully for extensive induration with adhesions and fixations, especially in the region of the seminal vesicles, whether there be hardness or not. Nodules which are much firmer than the adjacent tissue, a broadened, thickened and fixed membranous urethra with the same condition of the intervesicular notch, thickening and induration of the lymphatic channels and lymph glands around the upper end of the seminal vesicle and on the lateral wall of the pelvis, are particularly suspicious. The presence of some other type of bladder neck obstruction does not necessarily exclude the concomitant existence of carcinoma. The use of the cystoscope is of little value in examining for cancer, for while it may show some edema and elevation in the trigone, one sees nothing characteristic to act as a diagnostic feature of carcinoma as distinguished from a benign lesion.

The induration present in chronic prostatitis is not so stony hard as the malignant prostate; moreover, the fixation which is so frequently palpable in cancer

is lacking. In tuberculosis of the prostate, while there may be isolated nodules, or more diffuse induration, they are never so marked as in malignancy, and as a rule in cancer there is frozen fixation. Further, primary prostatic tuberculosis is extremely rare.

The prostate gland is richly supplied with lymphatics, by way of which the malignant process extends to the pelvic nodes, or by the perirectal plexus to the abdominal nodes. Dissemination through the blood stream occurs early and distant metastases, particularly in the bones, are often detected before the occurrence of any local symptoms. This is true of the small prostatic tumor which often disseminates widely. The high frequency of skeletal metastases with a predilection for pelvic and lumbar vertebrae have been noted by all observers. Graves and Militzer in a clinical review of eighty-one cases found x-ray evidence of metastasis to the pelvis and sacrum in 85 per cent, and to the lumbar vertebrae in 59 per cent, while the femur was involved in only 35 per cent and the thoracic spine in 23 per cent of the cases. Metastases in the bones have been commonly accepted as hematogenous in origin.

It is thus seen that the early diagnosis of malignancy of the prostate is of vital importance, and we are not to depend entirely on the examining finger, nor the experience of the surgeon, no matter how great that may be. The laboratory has its place, and the physician should first consider actual biopsy of the gland. In this connection the value of aspiration of tissue for biopsy should be emphasized. It is true that this presents a problem, not so much because it is so technically difficult for the surgeon, but rather because the pathologist may not be trained along the line of interpretation of smears. It must be remembered also that even though it is relatively simple to insert a needle into the prostate, guided by a finger in the rectum, and while if necessary it may be repeated with relatively little danger, the test is not infallible. If carcinoma cells are identified the diagnosis is established, but the absence of such cells does not necessarily rule out malignancy. One may easily miss a nodule with the needle.

Determination of the sedimentation rate is of relatively little value in early diagnosis, though it should be done routinely. We have seen active carcinoma on more than one occasion with an entirely normal sedimentation rate.

The one most valuable laboratory aid we have is the finding of a high concentration of acid phosphatase in the blood. The prostate is the only organ in the body which contains large amounts of such acid phosphatase. This enzyme does not enter into the circulation in demonstrable amounts from the normal, the hyperplastic, or even the cancerous prostate, while the capsule of the gland is intact. We know that this is true because the normal range values for acid and alkaline phosphatase in both men and women are the same. When prostatic cancer infiltrates adjacent soft parts, or when it metastasizes to distant soft parts or bone, acid phosphatase enters the blood stream and can be measured in the serum. Normal values for acid phosphatase are from 0 to 0.7 units (Bodansky) in each 100 cc. of serum when the alkaline phosphatase is normal, or as high as 0.9 units in 100 cc. when the alkaline phosphatase is high. Values above 1 unit per 100 cc. are considered pathognomonic of metastasizing prostatic cancer. While increased acid phosphatase indicates extension of prostatic cancer, a normal quantity of such phosphatase is occasionally found in the presence of an extensive tumor. However, while false negative findings do occur, increased phosphatase has not been reported except in the presence of such extension.

It is important that the laboratory doing such estimation have the routine standardized. In reading the literature we find several methods of reporting, some in the original Bodansky units, others in King-Armstrong units. In work done at Memorial Hospital in New York by Dean and Woodard, Woodard found in a large series of cases that there was a marked difference in the reduction of the substrate, depending on the pH range of the laboratory procedure. Investigation showed that there was a plateau in the vicinity of from 4 to 4.5 in which error was less apt to occur, and I suggest that if one employs this method of diagnosis, he follow the technic as outlined by her, for then less error will occur in the laboratory results.

The finding of acid phosphatase (any amount over 0.75 to be considered suspicious and the test to be repeated, and over 1.0 positive) means that it is already too late to perform radical surgery. If the aspiration biopsy is positive and phosphatase is normal, and is so on recheck, and no other evidence is found of metastasis we may consider this as a case for radical surgery and a possible cure. It is not within the province of this paper to outline the surgical procedure followed by Young and others.

In many patients the relief of the urinary retention becomes of paramount importance. In others, the amount of residual urine is relatively little but while one may temporize, retention must be taken care of in the majority of instances. Radical removal of the gland is not justified and a smooth, well-performed transurethral resection will provide the relief needed. This, however, is not a curative procedure; one must be governed by the condition of the patient as to the next step.

Much has been written and spoken regarding castration in these patients. Higgins, in his monumental work, proved beyond doubt the remarkable effects secured by this rather simple procedure. The experience of most urologists is, however, that while immediate clinical improvement may be secured, life expectancy is no greater than in those where no treatment is instituted. This fact has been advanced as argument against a mutilating procedure. My own experience, somewhat limited, would seem to bear out the fact that these patients, who are usually in great pain, particularly and often sciatic in nature, are usually not interested in sex, and being assured a reasonable likelihood that pain will disappear readily submit to orchiectomy. I know of nothing more spectacular in its effect. If, for some reason, the patient objects to complete orchiectomy one can do a subcapsular orchiectomy as outlined by Reeber. In this instance the tissue left behind is sufficient to make the patient think that very little has been removed. Of course one may, for cosmetic reasons employ one of the plastic testes or stainless steel ones, implanting them in the scrotal sac.

Radiation therapy must be considered. In general the reports on such treatment have been gloomy, though no more so than surgical treatment. Munger reported a series of cases in which there was apparent benefit. Radium therapy, whether given by ray or implantation has not shown much success, as reported by Barringer and others. We believe, however,

that high voltage therapy should be given the benefit of trial. Lloyd has stated that he not only believes radiation therapy directly to the prostate should be employed, but he also has raised the question of secondary castration and radiation to the adrenals for their possible effect on secondary sex characteristics. It is certainly worthy of consideration. Relief obtained by roentgen castration must necessarily be slower in its accomplishment than that by surgical methods. Accordingly, when a patient is in too great pain the delay which ensues may be an argument against such method of handling. Regardless of the castration surgically, I believe that the patient should be radiated directly.

In treatment of prostatic cancer we should also consider the use of the female hormone in producing chemical castration. Dean, reporting on the use of stilbestrol, gives a survey of some sixty patients treated in this manner, although he stated that it was too small a group from which to draw other than general conclusions. In his experience, surgical castration had provided spectacular relief. Others had been treated by stilbestrol, and while he found that some men were unable to take even small doses of the drug without nausea and abdominal cramps, eight patients were able to tolerate 2 to 5 mg. daily for a number of months without apparent difficulty. In these cases, there was the same general improvement, as great as that following orchiectomy, though the changes were slower. Under stilbestrol, he noted that there was diminution of the size of the tumor, and a corresponding decrease in the amount of residual urine. Conformation of the bodies of these men became feminine. There was an accumulation of weight, particularly around the hips; the breasts became enlarged, sometimes tense and painful, while the nipples and areolae turned brown. There was a decrease in the actual size of the genitalia. He stated that they had noted no relapses under stilbestrol treatment, although one patient had failed to respond favorably. He also stated that the hormone had proved beneficial when relapses had followed surgical castration. He further noted that the acid phosphatase which had been present had decreased in the same manner as that which occurs when surgical castration is performed. He finally concluded from his observations that patients with cancer of the prostate were made more comfortable when treated by castration or administration of estrogens, and that perhaps they lived longer. The majority, however, after a variable period of improvement, relapsed and died of the disease. He stated that endocrine treatment exerted different degrees of benefit on different types of cancer and might even provide a cure in an especially unusual case. He warned that we must not forget that prostatic cancers vary greatly in their natural history and in their response to other forms of treatment, such as irradiation.

SUMMARY

In summing up the management of prostatic cancer, several essentials must be considered.

1. The finger must be educated, and a careful rectal examination made in all male patients over 40 years old.

2. The use of aspiration biopsy should be encouraged and pathologists should train themselves in such special technics.

3. With the establishment of a positive biopsy and the absence of a high acid phosphatase, radical perineal prostatectomy should be considered.

4. Acid phosphatase estimation should be done by a standardized procedure, the optimal pH of the substrate being 4.5, as there is less chance of error at this level.

5. Acid phosphatase over 1.0 should be considered positive.

6. Retention may be relieved by means of transurethral resection. Prostatectomy by radical surgery is not indicated.

7. Surgical castration is followed by brilliant, spectacular results, immediate relief usually being secured. Life expectancy is not increased. A method of subcapsular orchiectomy is presented.

8. Roentgen therapy is discussed and advised. Irradiation of the adrenals for the effect on the secondary sex characteristics is presented. Endocrine treatment by administration of stilbestrol is discussed, and while the effects are slower in their onset, the end result may be as satisfying to the patient.

1813 Pine Street

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DISCUSSION

PAUL T. LLOYD, D.O., F.A.C.O.S., Philadelphia, Pa.: I am deeply grateful for the privilege of being invited to discuss the paper so ably presented by my distinguished colleague.

Dr. Sterrett has brought to our attention facts which I am quite sure we all should know and remember. But I am led to believe that all too frequently we forget the salient features bearing upon prostatic carcinoma, which leads to the frequency with which this condition is overlooked and undiagnosed until it is in an advanced stage of development.

Dr. Sterrett has again pointed out that the outlook for patients with prostatic carcinoma is, indeed, a dismal one—certainly insofar as cure is concerned, unless the malignant process can be eradicated by early diagnosis and prostatectomy when the neoplasm is still confined within the limits of the gland itself. Generally speaking, radiation therapy has not fulfilled the hopes of those who early advocated its use in the treatment of carcinoma of the prostate. Roentgen ray therapy has been employed to advantage in holding in abeyance the malignant growth, at least insofar as suppressing its development is concerned, and certainly no one will discount the fact that radiation therapy has been helpful in bringing about palliation when the disease has progressed to the point of skeletal metastasis. However, generally speaking, carci-

noma of the prostate is regarded as a radio-resistant type. This, together with the fact that it is more often than not difficult to get adequate doses of radiation into the carcinoma-bearing prostate, probably accounts for the poor results obtained by roentgen ray therapy.

The use of interstitial therapy probably offers the best approach to the treatment of carcinoma of the prostate by any of the several radiation technics developed up to this point. And it seems to me that if one is going to depend upon interstitial radium for controlling carcinoma of the prostate, then the best plan of treatment would be to expose the prostate gland directly, either by perineal or suprapubic approach and, using low intensity radium element needles, attempt to secure a satisfactory pattern by needling so that spacing of the multiple radiation foci would be equal and the needle pattern adequate to bring about as homogeneous a degree of radiation to the entire gland as possible. This I believe, however, is not easily and readily accomplished.

Of the cases treated with radiation therapy in our hospital over the past 14 years, but two have shown satisfactory response to roentgen ray treatment. In both of these patients prostatectomy was carried out, and at surgery it was found impossible to enucleate completely all of the enlarged gland and its capsule. It was, therefore, established in each case that residual carcinoma followed operation. Employing high voltage roentgen therapy, utilizing protraction fractionation technic, and delivering a high total dose to the prostate, these two patients have survived 2 and 4 years respectively. They are at present free of symptoms of prostatic carcinoma. They are able to carry on daily activities and work without difficulty, and, in the main, are leading what one might call average normal existences despite the fact that in each case, upon rectal examination, there is a definite, hard, resistant mass readily palpated in the region of the prostate, and there is, of course, no question but that residual carcinoma is still present in the postprostatectomized area. In other words, these two men are living, with carcinoma of the prostate which has been, up to till the present time, controlled. I believe that in both of these patients radiation therapy has contributed substantially to their survival.

The essayist referred directly to the role of the adrenal glands in prostatic carcinoma. The relation between the adrenals and prostate and testes is one that has aroused our deepest interest, since the adrenals have been well demonstrated to be secondary androgenic reservoirs. We have not, however, as yet employed radiation therapy to the adrenals, either for the purpose of extending the period of palliation following orchiectomy or in other cases where additional palliative and control effects might well prove beneficial. At the moment I hesitate to irradiate the adrenals since sufficient research work has not been carried out to provide a basis for known reaction to radiation on the part of the adrenal bodies.

Along this line one must, of course, also consider the pituitary body, since the anterior lobe of the pituitary undoubtedly exercises control over the testes and therefore, indirectly at least, the prostate. Some observers (McCullagh, Martins and Rocha)[1] believe that the germinal epithelium of the testes elaborates a second water-soluble hormone, the principle of which is called inhibin, which by indirect effect produces an inhibitory influence upon prostatic growth. Inhibin is believed to act upon the pituitary, restraining the latter from its stimulating effect upon the interstitial cells of the testes. It is believed that a decrease in the production of inhibin due to testicular regression at middle age brings about over-production of testosterone, which in turn results in prostatic hypertrophy. This theory of a second testicular hormone lacks complete confirmation at present. However, it does cause one to focus attention upon the hormonal theory dealing with carcinoma of the prostate and also causes one to wonder whether antagonistic hormones or anti-hormones might not play a considerable part as causes of carcinoma of the prostate.

Dr. Sterrett referred directly to Munger's work dealing with roentgen castration in metastatic prostatic carcinoma. My experience is exceedingly meager in the management of prostatic carcinoma through the medium of castration. I have had but one patient with proved carcinoma of the prostate to treat by this means, and in this particular instance the development of rapid vertebral metastasis resulted in the necessity of orchiectomy to bring about relief in the symptoms resulting from the metastatic process. I may say that following Dr. Sterrett's performance of orchiectomy this patient responded immediately and splendidly, with loss of all pain and bothersome symptoms caused by the metastatic malignant process.

Munger in his report of 1944, obtained his best results using a combination of transurethral resection, roentgen castration and estrogen (ethinyl estriadol). With this method he observed a more rapid response to roentgen ray therapy and also a more profound stabilization of the malignant process.

Further appraisal of Munger's method of managing metastatic prostatic carcinoma must rest not only upon future reports from his clinic, but also upon the work emanating from other hospitals where radiologists and urologists, cooperating in the control of the disease, employ the method described and reported by Munger.

48th and Spruce Streets

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Radiological Evaluation of Acute Abdominal Conditions

THEODORE C. HOBBS, D.O.
Columbus, Ohio

In evaluating an acute condition of the abdomen, the radiologist, the surgeon and the clinician are confronted with a problem demanding immediate attention. The surgeon's success and the patient's life frequently depend upon arriving at a proper diagnosis without undue loss of time. The radiologist is often able to confirm a diagnosis; frequently he is able to make it. Almost always he is able to add to the fund of information upon which the diagnosis is built.

The value of radiological consultation depends upon several factors. The most important is the diagnostic acumen of the radiologist. The condition of the patient, time available and equipment at hand are less limiting factors. It is not for the radiologist to assume the leading role or responsibility: x-ray findings should not replace careful clinical evaluation. If doubt remains, radiological consultation is desirable.

In many cases with acute abdominal symptoms bowel obstruction is an important consideration—the major one as far as the small intestine is concerned, and diagnosis may be difficult without aid of the x-ray. Often it is not possible to tell clinically whether the lesion involves the large or the small bowel or, if the latter, what part. Many times, though films give a clue, the exact point of involvement is masked. If intestinal obstruction is suspected the patient should never be given an enema before x-ray examination as the gas pattern may be changed and perhaps the point of lesion obscured. The same applied to the use of the Wangensteen apparatus.[1] The so-called ladder formation of distended intestinal loops, and fluid levels within the loops which may or may not be present, are readily recognized. The pattern, though pathognomonic of obstruction when seen, need not be demonstrable for diagnosis of obstruction of the small bowel. With the patient supine, the original films should cover the entire abdomen. If possible, pictures are

made also with the patient in the erect position. With a tilt table it is almost always possible to get at least a semierect exposure. Posteroanterior films in the lateral decubitus position may be substituted for the erect film if no tilt table is at hand. This often provides a useful supplementary film for the demonstration of fluid levels. Kerkring's[2] fold, the herringbone pattern seen best in jejunal distention, may often be seen very early. Free gas under pressure in the small intestine is strong presumptive evidence of an obstruction in that part of the bowel. The herringbone pattern of Kerkring's fold, when under pressure, may resemble the haustrations of the large bowel and a differential diagnosis may not be easy. Differentiation between obstructive and paralytic ileus usually is not difficult on the basis of clinical and roentgen findings. In ileus there is apt to be gas distributed throughout the bowel. The ladder formation usually is not marked, if present. In obstruction of the bowel, little gas will be present below the point of lesion, including the rectum.

The Miller-Abbott tube has been used effectively at Doctors Hospital both in the localization and presurgical treatment of obstruction. The newer mercury-weighted type of tube has proved to be as satisfactory as the other with the advantage of consuming less time in passing the pylorus. The tube is passed to the point where progress ceases, at which time 1 to 2 ounces of barium suspension may be injected through the tube, outlining the point of lesion. The physician must not be lulled into a false sense of security by subsiding symptoms when the Miller-Abbott tube is used. A case recently admitted to x-ray at Doctors Hospital had film findings which warranted a working diagnosis of a small bowel obstruction. The Miller-Abbott tube was passed by an interne and decompression begun. The surgeon saw the patient within an hour, but the entire clinical picture had changed. Surgery was performed upon the basis of the radiological findings. An obstruction of the mid-ileum was demonstrated.

Obstruction in the large bowel gives less characteristic findings, as considerable amounts of gas are frequently present without obstruction. In extreme cases the colon may be dilated so that the flexures are rounded out, giving a horseshoe shadow if the obstruction is low. A barium enema is usually needed for confirmation of the diagnosis. The Miller-Abbott tube may again be used to put a small amount of barium in the region above the lesion. Progress of the tube through the large bowel may be slow. When this procedure is combined with the barium enema, it may outline a lesion from both sides, giving information as to the extent of involvement. If complete obstruction is suspected barium by mouth should be used only if the diagnosis remains in doubt. One or two swallows of the suspension may locate the lesion and this quantity will not interfere with surgery.[3] Roentgen examination has little worth in evaluating acute appendicitis. After the acute stage, barium studies are of value. Pain on direct pressure is perhaps the most important differential point in locating the lesion under the screen.

The radiologist often has a therapeutic as well as diagnostic role in intussusception. Helmer[4] reports eighty-eight reductions out of 110 cases by barium enema under fluoroscopic control. All but ten patients were under 4 years of age. In the colon, a barium enema gives a characteristic picture with a cylinder-shaped pattern. If the obstruction is complete the finding may be a dilated blunt pattern, with an area of relative constriction immediately distal.

A perforated or ruptured viscus usually presents characteristic findings. It should be remembered that free gas in the abdomen will not be demonstrated unless at least 20 to 50 cc. of air have passed the lesion. If sufficient free gas is present, it can be demonstrated beneath the right diaphragm in an erect film. Lateral decubitus films may show it when the erect film is not possible. Gas under the left diaphragm usually represents the gas bubble of the stomach. Transposition of viscera is a possible source of error. It is well to be sure the patient's heart is on the left side. Free gas under the right diaphragm may be found in a subphrenic or other gas-forming abscess. However, free gas may also be found in the abdomen following fallopian tube insufflation, paracentesis, or laparotomy. These possibilities should be ruled out. When a subphrenic or hepatic abscess is present the right diaphragm is frequently slower in starting its excursion than is the left. The travel may be more limited than on the contralateral side, or there may be bilateral limitation or splinting. A freely movable diaphragm probably rules out the possibility of subphrenic abscess.[5] Subphrenic or hepatic abscess may cause localized lumps or convexities on the diaphragmatic shadow. Echinococcus cysts of the liver are characterized by calcification in the cyst wall. These sometimes rupture into the subphrenic space and may occasionally perforate the diaphragm. Often a disease condition of the upper right abdominal region will cause a secondary pathema in the basal lung or pleura. Right lung and pleural involvements may produce abdominal symptoms as their major manifestations. The radiological evaluation of abdominal symptoms should therefore include chest study.

Urinary calculi can usually be observed in a flat plate.[6] Nonopaque stones are rare.[7] Intestinal contents may interfere with visualization. Positive identification is usually possible by descending urography. Occasionally suppressed function may cause a nonvisualization on the side in question. Retrograde approach by ureteral catheter may be needed.

Gallstones with sufficient calcium may be demonstrated on flat film examination but these are in the minority. Frequently a large stone gives a characteristic picture of lamination from deposits of calcium upon a cholesterol base. Faceted stones are almost always of biliary origin, although they have been reported in the kidneys.[8] Dye examination of the gallbladder is useful if time permits and there are not contraindications, such as shock or a spreading peritonitis. At Doctors Hospital, intravenous dye is routinely employed on house patients unless contraindicated. This eliminates the possibility of faulty assimilation and consequent error. Biliary disease may be determined from nonvisualization by this method. Ninety-seven per cent of these patients have gallbladder disease.[9] Dye is administered orally in high or low blood pressure, with coronary disease or cardiac decompensation. It is to be remembered that a so-called "new gallbladder," from dilatation of the cystic duct stump following cholecystectomy, may contain stones. These have been demonstrated. Therefore, there is, if symptoms warrant, a plausible reason for dye examination of these patients.

Pancreatic stones are rarely visualized. When seen they are usually small, multiple and lying in a characteristic pattern,[10] extending upward and to the left from the bodies of the second and third lumbar vertebrae.

While this paper is not concerned with pediatrics, it should be mentioned that large quantities of gas are not unusual in the small intestines of newborn infants. This is not necessarily indicative of disease. If barium by mouth is used diagnostically on newborn infants, it should be suspended in water rather than in milk, as the fat content may delay progress of the meal.[11]

Doctors Hospital
1087 Dennison Avenue

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DISCUSSION

JAMES O. WATSON, D.O., Columbus, Ohio: It appears to me that Dr. Hobbs has covered this subject in a capable and thorough manner. I should like to emphasize two or three points which, in my opinion, warrant such emphasis.

First, the x-ray is a useful diagnostic facility. It is more useful to the trained clinician who has at least a general idea of what he is searching for than to the person who is relying solely upon it for the purposes of establishing a diagnosis. The value of x-ray consultation will be in direct proportion to the equipment at hand, the technical ability exercised in making the plates, and last but by no means least and certainly of greatest significance, the well-seasoned ability of the radiologist to interpret the plates.

I am glad Dr. Hobbs mentioned the transposition of viscera and suggested procedure to make certain that the viscera are normally situated in a given case. It may be that he remembers a case in Doctors Hospital very recently that was very confusing in this respect. A large bubble of gas, free under the right diaphragm, along with a clinical picture (not entirely classical, however) suggested the possibility of a perforated peptic ulcer. The bubble of gas under the right diaphragm seemed significant until it was discovered that there was a transposition of viscera in this case, that the bubble under the right diaphragm was in the cardiac portion of the stomach.

I am glad also that he mentioned that the chest must always be considered when one is confronted with an acute abdominal problem; this may be considered especially true in children and in the aged. Many children have had an appendectomy, as have adults for that matter, when the trouble was in the lung or pleura. Anesthesia and surgery in such cases are not helpful to the recovery of the patient.

I think it can be said also that many an appendix has been removed when the real offender was a stone in the right ureter, so radiological examination, sometimes combined with the consulting services of the urologist, is most helpful.

The final thought I would leave with you on the subject of acute abdominal conditions is this: Not infrequently the panic and fear prevalent in the mind of the patient and the members of his family are transmitted to the attending physician and, in some instances, enhanced by him. It is well that as consultants and surgeons we insulate ourselves against the contagion of fear, panic and confusion. When the physician does this, a surprisingly large number of cases admitted as acute abdominal emergencies will ultimately come under correct classification in some less startling clinical attire.

50 E. Broad Street

Congenital Malformations of the Uterus

F. C. TRUE, D.O.
Providence, R. I.

Congenital malformations of the uterus, although comparatively rare, are occasionally seen by the surgeon.

In normal embryological development, the uterus is formed by the fusion of the middle portion of Müller's ducts. Before the third month, the caudal ends of these ducts press together and form the single primordium of the uterus and vagina. The paired cranial portions of the müllerian ducts become the uterine tubes whose ostial ends later undergo a body descent from the level of the third thoracic to the fourth lumbar vertebra. With the tubes thus formed, the middle transverse portion of the duct forms the uterine fundus and body, while the distal longitudinal portion of the duct forms the uterine cervix and vagina. A distinction between the uterus and vagina is not evident until the middle of the fourth month of fetal development. When proper fusion of the middle portions of Müller's duct does not take place uterine abnormalities result.

The most common anomaly is the infantile uterus, which is represented by a rudimentary type of development. The cervix is conical in shape and the external os is extremely small. The entire organ is cylindrical in outline and does not measure more than 1½ to 2 inches in length. The mucous membrane of the fetal uterus is poorly developed, and it is said to lack secreting glands. The corrugations of the endocervix extend into the fundus. Combined with uterine deformity, there is often imperfection in the vulva, vagina and breasts. The tubes and ovaries may be rudimentary or normal. Menstruation is extremely scanty or entirely absent, but if present is nearly always accompanied by excruciating pain.

Therapy directed to the correction of this anomaly has not proved satisfactory. If the menstrual cycle is carried on and accompanied by menstrual pain, sedative drugs, excluding morphine, are indicated. Organic extracts have been of benefit in some cases. If drug therapy is ineffectual, oophorectomy may be necessary. No constructive surgical treatment has yet been found.

When one uterine horn alone develops the condition is known as unicornate uterus. This may be comparatively well-formed and function normally as to menstruation and procreation or it may be poorly developed and functionless.

The septate, bifid or biloculated uterus usually displays no external evidence of internal derangement, although in certain cases an anteroposterior fundal depression or notch is present, suggesting a septum. In this type of uterus the cavity is partially or completely divided by an anteroposterior septum or partition. This curtain of tissue may divide, or partially divide, only the fundal section of the uterine cavity, or it may extend to the internal os or beyond. When the external os is divided by a septum the malformation is designated uterus biforis. The partition may be incomplete, or the curtain of tissue may extend only to the internal os or into the cervix but not to the external os. These various subdivisions of the anomaly are more of teratologic than of practical clinical interest.

Function in the bicornate uterus is more likely to be carried to successful fruition than in the infantile or unicornate types: if the uterus is rudimentary and conception takes place abortion will probably occur.

The bicornate uterus may represent a step in the development of two separate uteri, but the separation involves the upper section only. Fusion occurs in the lower or supracervical section of the müllerian tract, but union is lacking above. As a congenital anomaly, the bicornate uterus stands midway between the bifid and the double uterus. Occasionally union extends beyond the cervical region and may reach as high as the fundus, the bicornate character of the deformity being suggested externally only by a simple fundal depression or notch. The size of the two horns may be fairly normal or they may be rudimentary and unequal.

The rudimentary type with inequality of the two sides resembles the unicornate uterus. Generally there is great variation in the separation of the two bodies. In the most pronounced cases they are wide apart superiorly, being divided with an intervening band of tissue passing from the bladder to the rectum. When widely separated, the left horn is often directed slightly forward, indicating a degree of torsion. In still other cases the two horns, while separate, are closely approximated and may even rest side by side.

There may be one or two cervices with two complete tracts into the respective uteri, or there may be two cervices with only one opening into one of the uteri. The cervix may be rudimentary or fairly normal, corresponding to the development of the two horns. The horn cavities may approach normal dimensions, but if the bodies are extremely rudimentary the cavities may be represented by small tubular canals or may be absent altogether. Imperforation of the horns is sometimes found. Closure may occur in any section of one or both sides and result in the accumulation of secretion and menstrual fluid. In some cases of bicornate uterus the vagina is involved but in others it may show no abnormality. The external genitals are usually normal.

The symptoms incited by this deformity and the one next to be described, the double uterus, depend upon alteration of function, evident in ovulation, menstruation, gestation or parturition. Conception may take place in one horn and menstruation continue from the other. In some cases this probably accounts for the occasional continuation of menstruation during pregnancy. Sometimes conception occurs simultaneously in both horns, or at different periods in each, possibly accounting for some of the cases of superfetation. In bicornate uteri, when gestation continues to full term, parturient complications such as fetal malposition, fetal obstruction, uterine rupture or postpartum hemorrhage occur in approximately 60 per cent of cases.

Genital deformities may be suggested by an absence, or some abnormal behavior, of the menstrual cycle. If menstruation occurs every 2 weeks, or does not cease during gestation, there is at least some justification for suspecting a uterine anomaly. Evidence of multiple or double organs in the lower section of the genital tract, either in the vagina or cervix, strongly suggests the extension of the deformity to structures higher up. Sometimes an anomaly is not recognized or even suspected until pregnancy or labor (premature or mature) occurs. Most commonly it is discovered accidentally during examination or operation.

In the double uterus, there is a complete separation not only of the uterine body but also of the cervix. Each body is provided with an individual tube, ovary, broad and round ligament. The two cervices may open into a single vagina or there may be two vaginae, as well as two distinct uteri. The two uteri may attain fairly normal development, and each may function normally. As a rule there is a degree of disproportion in the two sides, one uterus approaching normal proportions while the other is only partially developed. In the poorly developed side, interior deformity may exist which withholds the menstrual fluid and forms a hematometra.

Uterine duplication, with or without vaginal deformity, is not infrequently accompanied by anomalous development in the neighboring organs, either in the urinary or the intestinal tract, or both. Norman F. Miller collected 54 cases from the literature. Thirty-four of the patients were married and 31 became pregnant. Less than 50 per cent of these went to term. The complicating conditions observed in the deliveries at term in order of frequency were: (1) enlargement of the nongravid half of the uterus, (2) obstruction to fetal passage by vaginal septae, (3) uterine inertia, (4) tetanic uterine contractions, (5) retention complications such as hematometra, and (6) eclampsia.

Miller stated that malpresentation is less common in double uteri, except when the pregnancies are bilateral, than in the bicornate uterus. He found that postpartum hemorrhage and involution occurred more frequently than under normal conditions. Of the 54 cases studied, hematometras were found in 8 and pyometra in 1. On the whole what has been said regarding the clinical features of the bicornate uterus applies also to the double type and to the bifid uterus.

A second, or accessory, uterus is the rarest variety of uterine malformation, although a few authentic cases have been recorded. This deformity is believed to be due to a diverticulum of the müllerian canal. Accessory uteri have been reported by Hollander and Skene. In each case the organ was extremely rudimentary and not supplied with tubes, ovaries or supporting ligaments. In both instances the organs were anchored to the anterior surfaces of normal uteri and connected with the interior at the internal os. Hollander's case was discovered at operation and the patient had given birth to seven children at full term. She also had had three abortions, once with twins at the fourth month. In Skene's case, secretion was

manufactured and discharged by the accessory organ.

It may be well to refer briefly to certain other types of uterine maldevelopment.

Congenital stenosis of the internal or external os in the cervical canal sometimes occurs independently of other uterine deformities, although stenosis more frequently accompanies the anomalous conditions already described. If stenosis is complete, in whatever situation, with the advent of puberty or sometime thereafter, it imprisons the menstrual fluid and results in a hematometra or hematosalpinx.

A deformity in which the fundus is lacking and the normal fundal convexity is lost is sometimes observed. This anomaly is referred to as the anvil-shaped uterus.

Occasionally the cervix is divided transversely by a septum or curtain of tissue, or it may be rudimentary or entirely absent. Poor cervical development is nearly always accompanied by similar alteration in the uterine body.

Alterations in position of the uterus are not to be classified literally with anomalies of development.

Unless a uterine deformity is associated with undue distress or retention phenomena, treatment is not indicated. In all cases a conservative plan is wise, but the course of therapy to be adopted will depend entirely upon the exigencies of a given case. Castration or hysterectomy are indicated in case of an abnormally developed uterus associated with excessive menstrual pain, if other measures fail. A hematometra may be overcome by incision to afford drainage, or hysterectomy may be necessary. Uterine deformity of the septate type, accompanied by an extension of the septum into or through the vagina, is relieved by excising the vaginal partition. The cervical septum may be incised or destroyed by cautery. Gestation sometimes acts as a natural therapeutic agent, and partitions or septae may be destroyed thereby.

If pregnancy is recognized in a rudimentary uterine horn, hysterectomy is indicated.

Deformities offering obstructive barriers to delivery are relieved by incision or, better, by sidestepping the obstructive complication by cesarean section. Other parturient complications are treated in accordance with the symptoms they produce.

Another type of anomaly, the double uterus, was found in a primipara, 22 years of age, at term and in labor. I was called in consultation because of prolonged labor with apparent inability of the fetus to engage. Examination revealed a breech position, and local examination revealed a mass the size of an orange in the right lower quadrant, which was apparently interfering with the descent of the fetus. Cesarean section was deemed advisable and a normal baby was delivered. Then the mass on the right side was identified as a second uterus and was removed supravaginally. The right ovary and tube which were healthy, together with the round ligament, were sutured to the remaining uterus. Later local examination was made revealing a separate vaginal tract on the right side with a small cervix presenting. The second vaginal opening was a mere slit in the labia, but a definite partition existed. This condition had been overlooked in the manual examination prior to operation. Excellent recovery followed the cesarean section. This anomalous condition would not have been discovered had not the patient shown dystocia or been subjected to a laparotomy.

Another example of the double uterus was that of a girl, 12 years of age, who complained of constant pain in her rectum, present since her first menstrual period 2 months earlier. She had experienced two periods, both of which were reasonably normal with the exception of dysmenorrhea. Rectal examination revealed a large mass in the left lower quadrant which was believed to be an ovarian cyst. At surgery a large mass was found which extended from the midline, filling the entire lower quadrant and extending down over the iliac vessels. This included an enlarged uterus, distended left tube and cystic ovary. Another uterus of normal size, was present on the right side, having a normal tube and ovary. Following removal of the mass it was found that a cervix for the left uterus was present but not patent, which accounted for the hematometra and hematosalpinx. This patient's convalescence was uneventful and she has had normal periods and has been in excellent health since surgery.

Another case of double uterus, with hematometra and hematosalpinx is that of a girl 15 years old, seen first in May 1946. She complained of pain in the lower right quadrant extending down the thigh, accompanied by intermittent, profuse vaginal discharge. These symptoms first appeared in August, 1945, and the pain since that time had become more severe and constant in the right side. Menses had begun at the age of 13 and were irregular and painful. There was a definite connection in the history between the discharge and the pain. The serous discharge increased with the pain and became less with cessation of pain. My associate, Frederick S. Lenz, first saw this girl late in April of this year, and arrangements for operation were made. On May 16, 1946, laparotomy revealed a large right ovarian cyst and a markedly dilated right tube. The right uterine body was also distended and contained menstrual fluid. The cervix of this uterus was not patent, but a small probe could be passed through the endocervix of the pathological uterus to the normal cervix. This probably accounted for the serous discharge from which the patient suffered. The left ovary, tube and uterus were normal. Surgery consisted of a right supravaginal hysterectomy and right salpingo-oophorectomy. Convalescence was tranquil and the girl was discharged from the hospital on the eleventh postoperative day in excellent condition. She reports that periods are normal in all respects since her discharge from the hospital.

CONCLUSION

These congenital malformations of the uterus are admittedly rare, nevertheless the possibility of their occurrence should be borne in mind in cases of amenorrhea, dysmenorrhea or unexplained profuse leukorrhea, especially at puberty. The accessory uterus can produce dystocia and prevent normal delivery.

In the treatment of children with congenital anomalies, or even with less serious pelvic conditions, it is psychologically important that in the presence of the child the doctor refrain from detailed explanations of abnormalities present. Obviously the parents should be informed of actual conditions found.

Osteopathic Hospital of Rhode Island,
1763 Broad Street.

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Differential Diagnosis

Between Urological and Intra-Abdominal Lesions

C. LLOYD PETERSON, D.O.

Denver

Charcot said, in 1857,[1] "Disease is very old and nothing about it has changed. It is we who change as we learn to recognize what was formerly imperceptible." Many advancements in the field of urology, both diagnostic and therapeutic, have been made since that was written, yet there is no field of medicine wherein the comment is more applicable than in urology. However, despite the tremendous strides made in the development of diagnostic instruments, perfection of technics, appreciation of pathological processes, and the emphasis placed upon the necessity for careful diagnosis, it is obvious that far too many operations are performed for the relief of abdominal symptoms which are urological in origin.

Contemporary writers, considering the problems of differential diagnosis, recognize that increased knowledge has naturally resulted in specialization. They also point out that such a system may easily result in narrowness and urge that a constant interchange of ideas is essential to avoid that danger. Brown and Wakefield[2] direct attention to the fact that gastrointestinal disease may be manifested by urological symptoms, just as urinary pathology may be accompanied by gastrointestinal symptoms. These writers, in discussing this situation, suggest that we return to the fundamental concept that each patient is a law unto himself, and that while general principles help us to rationalize there remains the necessity of evaluating the individual problem, which necessity is not met by thinking in terms of entities of disease, such as cholecystitis or hypernephroma. They state: "A knowledge of rules, percentages, etc., plus experience are of great value, but at best, they serve only as aids in dealing with each patient."

There is evidence that many patients are subjected to abdominal surgery without good results, because the pathology is located within the urinary tract, as indicated by relief of symptoms from subsequent urological procedures. Our own general surgical experiences have afforded extensive evidence of this fact. Studies made of series of cases by groups and clinics result in the same conclusion. The great number of articles describing this prevalent source of error in diagnosis can indicate only that such errors are common, though largely unnecessary. Kretschmer,[3] Lowsley and Twinem,[4] Beer,[5] Hartsock,[6] Blum,[7] Wallace[8] and many others currently point out that the number of patients undergoing unnecessary and non-result-producing abdominal surgery is large and that such errors would not occur if more patients were considered and studied from a urological standpoint. In this paper I shall attempt to list some of the possible sources of error and also shall discuss some of the commoner ones. Surely it behooves us as osteopathic surgeons to be alert to all of the possible causes of the symptoms of our patients before subjecting them to surgery. We should be aware that our work is liable to more severe criticism than that of any other group.

REFLEXES AND MECHANICS INVOLVED

Randall and Hughes[9] write interestingly on the subject of reflexes. They differentiate between intrinsic and extrinsic painful stimuli arising from the upper urinary tract. The intrinsic are held to be those which arise from the vegetative nerve endings within the urinary tract (renal pelvis, ureter or renal capsule), while the extrinsic are those arising from irritation of the cerebrospinal sensory nerve endings in the periurinary parietal peritoneum. They describe the visceral layer, and the serous surface of the parietal layer, of peritoneum as being insensitive, while the outer surface of the parietal layer is abundantly supplied by sensory cerebrospinal nerve fibers. The intrinsic painful stimuli, they state, are mediated through the visceral afferent fibers which traverse the renal plexus, which in man is made up of branches from the celiac ganglion which, in turn, receives connections from the vagus and splanchnic, and also from the superior mesenteric ganglion and aortic plexus. Extrinsic stimuli are transmitted by the sensory nerves which have endings in the parietal peritoneum. These writers further state that acute abdominal pain is often the first symptom of upper urinary tract disease, and that frequently the abdominal pain and associated gastrointestinal symptoms, though entirely renal or ureteral in origin, are so typical of the acute surgical abdomen that laparotomy is performed, and that this is more likely to occur if upper urinary tract symptoms are minimal or, as is often the case, completely absent.

Intra-abdominal symptoms and signs of urinary pathology are also produced by direct physical or mechanical means. Scholl[10] directs attention to the earlier writings of Maclaglen and Treves in 1900, and White in 1892, which appeared in British medical literature, and which described the production of jaundice and other symptoms of gallbladder and bile duct disease occurring as a result of the movable right kidney. Scholl describes the phenomena as resulting from peritoneal tension and from traction upon the second portion of the duodenum (especially 2 or 3 cm. below the entrance of the biliary duct), which produce biliary stasis by mechanical means. Even now, more than 50 years after these earlier writings, we do not often enough remember that all is not gallbladder (or bile duct) disease that seems to be. Such cases too often are considered on a urological basis only after abdominal surgery has failed to reveal the presence of the suspected disorder within the gallbladder or within the biliary passages.

RENAL PAIN

Renal pain, or other pain of urinary tract origin, has some fairly consistent and definite characteristics. Pain due to renal disease usually begins in the lumbar region, or the lateral or anterior renal region, and radiates downward or forward, frequently following the course of the ureter, into the pelvis. Inflammatory kidney pain is usually aching in character and increased by pressure. Noninflammatory kidney pain is usually more severe and is paroxysmal. Attempts have been made to localize lesions of the ureter (calculus, stricture or other) by the distribution of pain. Mid-ureteral lesions are said to radiate downward only as far as the symphysis, and through anteriorly at the level of the posterior superior spine. Lesions of the lower third of the ureter give rise to pain in the scrotum or labia, and inner or outer aspect of the thigh. Ockerblad and Carlson[11] have mapped eight levels of surface distribution of pain arising from the ureter. They felt that they were able to show the "focal point of ureteral pain" located just inside McBurney's point on the right side and suggested that this fact could be utilized in the differential diagnosis between ureteral pain and appendicitis. While the location of pain is a worthwhile symptom, such a finding alone constitutes too slender evidence upon which to base a diagnosis.

CAUSES OF ABDOMINAL PAIN

An incomplete recitation of the causes of acute or chronic pain in the right upper quadrant would include lesions of the liver, lesions of the pyloric end of the stomach, duodenal pathology, gallbladder, biliary duct and appendiceal disease, and pathology of the colon, of the right kidney and of the pancreas. As causes of acute pain in the right lower quadrant there are acute appendicitis, acute salpingitis, distention of the cecum with gas, right ureteral calculus, twisted pedicle of right ovarian cyst, right-sided ectopic pregnancy, acute ureteritis, pelvic abscess, retained right testis, pathology of the pelvic bone structures, incipient or actual inguinal or femoral hernia and trauma. Subacute or chronic pain of the right lower quadrant may result from any of the above, and in addition, from right nephroptosis, tuberculosis of the right ureter or kidney, neoplasm of the cecum or ascending colon, ulcerative colitis, ileocecal kink (Lane's kink), appendiceal or cecal adhesions (which might be either congenital or postsurgical), psoas abscess, sacroiliac joint disease, lymphadenitis, partial or complete intestinal obstruction, arthritis of the lumbar vertebrae, and others. It should also be remembered that chest conditions, including pleurisy and pneumonia, can result in pain referred to the abdomen. The obviously large number of potential causes of pain in the right abdomen permit conception of the occasion for error in this field of diagnosis. The right side has been considered more especially, since that is the site of the greatest incidence of error.

Barney[12] observes that in from 15 to 20 per cent of diagnosed lesions of the kidney and ureter, abdominal operations had been performed without relief of the symptoms. More commonly occurring uropathies which produce abdominal symptoms and for which abdominal operations are performed are: (1) ureteral stricture, especially in the female; (2) nephroptosis, frequently resulting in angulation of the ureter and hydronephrosis; (3) redundant ureter; (4) aberrant renal vessels resulting in interference with renal drainage and consequent hydronephrosis; (5) calculus formation, and (6) inflammatory processes either within or without the ureter, which ultimately result in stenosis or stricture. Faulty drainage and back pressure often produce symptoms in these cases but all are potential or actual sites of infection and calculus formation.

Various men have studied series of cases in pursuit of more knowledge regarding this diagnostic enigma. Their findings indicate that the operations most frequently performed for the relief of right-sided abdominal pain, urological in origin (as evidenced by relief of symptoms from subsequent urological procedures), are appendectomy, cholecystectomy, oophorectomy, salpingectomy, uterine suspension and operations for relief of "adhesions." Further consideration of the same cases reveals that the procedures which resulted in symptom relief included simple dilatation of the ureter with lavage of the kidney pelvis, nephropexy, palliative application of pad and belt to maintain the kidney in position, nephrectomy, nephrotomy, pyelotomy and ureterotomy.

Lowsley and Twinem[3] report their conclusions in a study of 84 such cases. Fifty-nine per cent were females, ranging in age from 16 to 74, averaging 37.75 years. Forty-one per cent were males, from 16 to 76, averaging 35.41 years. More than 50 per cent of these cases had been misdiagnosed as having "simple chronic appendicitis," or "appendicitis, with some other abdominal complication." Thirty-nine patients, or 47.5 per cent, had previously undergone some major surgical operation without relief of symptoms. Fifty-one of the patients were cured, or relieved of their disease or discomfort, by such simple and conservative urological maneuvers as application of abdominal pads with suitable belt, dilatation of ureter for the relief of stricture or calculus, or both, drainage of pyelitis by means of an indwelling ureteral catheter, renal pelvic lavage, and the administration of urinary antiseptics (which would be effective only in the absence of obstruction).

Thirty-two of the 84 patients were operated upon. These operations included 18 nephrectomies, 7 pyelotomies, 3 nephrotomies, 3 nephropexies, and 1 ureterotomy. One tuberculous patient should have had, but refused, surgery.

It can be concluded from a consideration of this and other series of cases that patients frequently need urological study which they do not receive. Another effect of such studies has been the establishment of the practice, in many better clinics and hospitals, of discouraging or prohibiting, or both, the performance of abdominal operations upon the diagnosis of undemonstrated and unproved conditions such as "chronic appendicitis," "chronic cholecystitis," "adhesions," and "indefinite pelvic pathology," until after the patient has had the benefit of urological study. Students of this subject have made various estimates of what the ratio of urological cases to general abdominal cases in patients requiring hospital registration should be. The estimated proper ratio, if cases are correctly diagnosed, is in the neighborhood of 1:15. Perhaps such a figure might be utilized as a criterion of our own accuracy if we would review the statistics of our institutions and of our individual services.

INCIDENCE OF ERROR IN DIAGNOSIS

Appendicitis.—Lesions of the gastrointestinal tract probably constitute the largest group that requires

differentiation, and consequently provides the greatest source of error. Appendectomy is the operation most often performed to relieve abdominal symptoms of urinary disease. Blaisdell[14] states that many patients are still being operated upon for appendicitis without relief of symptoms, and that pain in the right lower quadrant of the abdomen, when not accompanied by gastric symptoms or fever, points to disease of the urinary tract as often as to the appendix. He concludes that any sign or symptom which, after careful study, seems to arise from the urinary tract is an indication for a complete urologic survey.

Acute appendicitis and acute pyelitis may be difficult to differentiate, especially in case of an acute appendiceal pathology that also has erythrocytes and leukocytes in the urine. Children with acute pyelitis frequently show no evidence in the urine for as long as 48 hours. The urgency of appendectomy is frequently not as great as it is thought to be, and a little time and some careful study of the patient and his urine may provide opportunity to avoid the error of appendectomy for the relief of what is actually acute pyelitis. Chills, a higher temperature than is usual in appendicitis (up to 102 or 103 F.) and a leukocytosis of 20,000 or more, with an exaggerated left shift, are fairly pathognomonic of pyelitis. Surgery for the relief of "chronic appendicitis," where the symptoms are urological in origin, is inexcusable, since time is not a factor and the urological tract should have been considered before the decision to operate was made.

Gallbladder.—The problem of differential diagnosis between lesions of the gallbladder and those of the kidney has become greatly simplified since the advent of pyelography and cholecystography. These two procedures will frequently decisively locate the trouble at one site or the other. Roentgenologic examination should be coupled with other diagnostic aids including history, cystoscopic examination, selective renal functional tests and study of selected specimens of urine, study of aspirated duodenal contents, and routine laboratory procedures, along with blood chemistry examinations. Thus the site of the disease can usually be localized and a decision made as to which is the source of symptoms.

Adhesions.—It is obvious that there is a marked tendency to operate upon patients for "adhesions" after pelvic or abdominal surgery has failed to relieve their symptoms. In many cases surgery for the relief of adhesions is performed without any attempt to demonstrate that such adhesions do exist and are producing the symptoms. Competent radiological consultation would prevent error in such cases and direct attention to the urinary tract, which upon adequate study might well reveal the source of the distress. It is unjustifiable surgery to operate for the relief of radiographically undemonstrable "adhesions" without a study of the patient's urinary tract, which would include ureteropyelograms.

Pancreatic Lesions.—While pathological conditions of the pancreas, especially cysts, are considered to be rare, they do occur. The onset is usually slow and the disease progressive. Sooner or later a palpable mass develops and organs are displaced. The kidney and ureter are among the parts which may be so displaced, although this is not a constant finding. Ormond, Wadsworth and Morley[15] call attention to the fact that typical renal-ureteral distribution of pain can emanate from cystic and other diseases of the pancreas and can easily be confused with renal lesions.

Lesions of the Colon.—It is not infrequently necessary to determine whether abdominal pain originates from the kidney or ureter or from the colon. Ulcerative colitis, the so-called "irritable colon," neoplasm, Lane's kink, and postoperative or congenital adhesions may produce symptom complexes similar to those resulting from uropathies. Radiographic study of the ingested barium meal and barium enemas, along with ureteropyelograms and other studies of the urinary tract, will provide the information upon which an intelligent conclusion may be based.

Gynecological Lesions.—The incidence of error from this source is second only to that of appendicitis. The number of women who have unsuccessfully undergone pelvic surgery for the relief of lower abdominal symptoms is legion. A thorough attempt should be made to determine that the pelvic disorder to be corrected is actually the source of the symptoms. In many cases disease of the urinary tract will be found to be causative. Various urological conditions, chief among which is ureteral stricture, produce pelvic pain. Patients suffering such pain obtain relief only after the urinary pathology is eliminated.

Lesions of the Spine.—Since lesions of the spine, as well as renal conditions, are capable of producing pain in the back, and also radiating pain, it is often necessary to consider the patient from both orthopedic and urologic viewpoints to determine which is producing the symptoms. The spinal lesions most likely to require differentiation are: arthritis, congenital vertebral anomalies, herniation of the nuclear pulp and osteopathic lesions. In this group of cases urological study, including ureteropyelograms, and appropriate x-ray studies of the spine, will supply the evidence needed to arrive at an accurate diagnosis.

Retroperitoneal Tumors.—These tumors do occur and, while producing no typical symptoms, cause displacement of the kidney pelvis and changes in the course of the ureter. Retrograde pyelograms can enlighten the diagnostician in such cases and permit him to evaluate the problem adequately.

CLINICAL REFERENCES

The writer has found, in his own limited experience, cases that are demonstrative of the problems mentioned. One female patient, 50 years of age, had undergone cholecystectomy, appendectomy, and two operations for "adhesions," all performed to relieve recurring acute attacks of colicky pain in the right upper quadrant, which had required a narcotic for relief. Subsequent extirpation of an almost totally destroyed kidney permanently relieved her of a condition of more than 20 years' standing.

Another patient had had her appendix removed, also a pelvic operation, and had refused cholecystectomy for the relief of constant pain in both the upper and lower right quadrants. Urological study revealed the presence of a massive, nonfunctioning kidney which was removed. The pathologist could find no functioning tissue remaining in the organ and the kidney itself was simply a large abscess. The patient was relieved of her symptoms after more than 10 years of discomfort and undergoing two operations of doubtful necessity. Cases of abdominal distress and pain have been relieved by nephropexy which provided for adequate renal drainage. Numerous patients have had abdominal and pelvic pain relieved by dilatation of ureteral strictures, frequently after the patient

had undergone appendectomy or pelvic surgery for the relief of the pain without result. It is occasionally necessary to enlarge the ureteral orifice in such cases by meatotomy, but this procedure, like ureteral dilatation, is usually a simple one.

It is also possible for disease of the generative system to manifest itself by presenting urinary symptoms. One patient was relieved of urinary frequency and dysuria when a large fibromyomatous uterus, which was encroaching upon the bladder, was removed. Another patient was relieved of what was thought to be renal pain when, after careful study, the gallbladder was removed. The urinary system was entirely normal but the gallbladder was enlarged, prolapsed and nonfunctioning.

I suppose it is possible to become overenthusiastic regarding the matter of urological survey in cases of abdominal distress. But it is surely true that at present the pendulum is swinging in the other direction, and far too few cases are given the benefit of this approach. At any rate, the finding of normal conditions upon urological study is not accompanied by the stigma attached to abdominal surgery that does not relieve the patient. Few patients will criticize the surgeon for being overly cautious in their behalf.

UROLOGICAL LESIONS DIAGNOSED AS INTRA-ABDOMINAL DISEASE

Pyelitis.—It has been pointed out already that acute pyelitis must be differentiated from acute appendicitis and acute salpingitis. Careful observation of the patient and repeated urinary studies are certainly in order in these cases. Persistent, less acute or recurring renal infections require the same consideration and, in addition, meticulous study to locate and evaluate the usually present obstructive lesion.

Nephroptosis.—The term, "movable kidney," is usually applied to a kidney whose excursion exceeds the normal movements incident to respiration and change of posture. Palpability is not of necessity a criterion of the pathological nature of the organ. Nephropexy has, in the past, been considered in various lights. During the later years of the nineteenth century, and early years of the twentieth, the number of such operations performed assumed the proportions of a fad, and many were unproductive of good results. Subsequent to this period the operation fell into disrepute generally. During recent years, largely due to improvement of urologic diagnostic technics it has become possible to differentiate the nephroptosis that is without symptoms or disturbed physiology from that which is accompanied by symptoms and functional disturbances. Nephropexy, in selected cases, is again considered to be a valuable and result-producing surgical procedure. Eisendrath and Rolnick[16] emphasize the importance of the emptying time of the kidney as an indication for the operation. Serial films are utilized and an emptying time of from 8 to 10 minutes is considered normal. Herman[17] says: "Some of the symptoms described are so remote as to test the credulity of the physician as to their renal origin," and suggest that, in addition to preternatural mobility, the relationship of the ptotic kidney to other forms of splanchnoptosis must be determined, and that the part played by the movable kidney in causing symptoms must be determined. Indigestion, hyperacidity, distention, anorexia, nausea and vomiting, constipation and diarrhea, and loss of weight and strength, are listed as symptoms. In addition to the pain and symptoms produced by such a kidney the hydronephrosis and other pathological states produced within the organ are of very real import to the future welfare of the patient.

Hydronephrosis.—Regardless of its cause, distention of the renal pelvis occurs either with or without pain or other symptoms, and is occasionally discovered only on routine examination. A hydronephrosis may become exceedingly large and be confused with intra-abdominal enlargements, or as a result of pressure produce symptoms abdominal in nature. This condition is an item for differentiation more frequently than it is so considered.

Calculus.—The typical case of renal colic will rarely be the source of confusion, because of the nature and distribution of the pain. However, it is important to note that stones do form without the production of acute or other symptoms. In some cases the stone produces symptoms only when it becomes dislodged and engaged in the ureter. In other cases the stone will never produce acute colicky symptoms but will manifest itself by low-grade pain and distress, or by persistent or recurring pyuria or hematuria or even by vesical symptoms. The symptoms produced by calculi can be intra-abdominal in nature and require differentiation from abdominal disorders.

Anderson and McDonald[18] have recently written in a most enlightening manner of the incidence of microscopic calculi in the pyramids of the kidney, and of their origin, morphologic characteristics and significance. They conclude that microscopic calculi probably occur in the kidneys of all people above the age of 10 years, and propose that perhaps renal calculus is a systemic or dietary disease and not a disease of the kidney *per se.* This proposal is based on the final interpretations of their study which were that in the process of reabsorption of high threshold substances (calcium and related ions) these substances are engulfed by phagocytic cells, which may be macrophages. These ions may first cohere in small masses or "flecks," before being engulfed by the individual macrophage. Soon the cell contains so much of the metal that it loses its identity and forms spherical droplets. By cohesive attraction these droplets come together in groups to form a tiny calculus or plaque, which we have chosen to call a microscopic calculus. The outlines of the droplets can still be seen about the border of the lesion. Finally, all identity of the original droplet is lost in the amorphous plaque. These writers conclude that this happens in practically all kidneys and explain that symptom-producing calculi result after these tiny calculi are found ulcerating through the membrane of the papillary tip, as is apparently frequently the case, only in cases wherein the inciting factor, dietary or systemic and extrinsic, is present. They further explain that when this calcareous deposit breaks through the epithelium at the papillary tip it is exposed to continual bathing by the salts of the urine and thus may form a layered concretion or stone, which may break loose and form a calculus producing symptoms. They further suppose that this microscopic calculus may well serve as a nidus for any type of stone, whether it be oxalate, urate, xanthine, cystine, carbonate, or phosphate, when the proper inciting factor appears.

Stricture of the Ureter.—This condition was little regarded until 1911 when Hunner began his long series of publications on the subject. Hunner[19] said: "The close relationship, embryological and anatomical, between the genital and urinary tracts . . . [causes] the signs and symptoms of disease in one tract [to be]

erroneously referred to the other." While urologists and gynecologists generally fail to agree with Kelly and Hunner, it is true that these men have repeatedly directed attention to the distress caused women by stricture of the ureter. Hunner[20] further writes: "The more prominent features which lead one to suspect stricture are the complaint of backache, or of pain in the pelvis, and of bladder symptoms. To these leading symptoms the patient often adds the complaints of headache, gastro-intestinal distress and pains about the hips and down the thighs." He also states that 20 per cent of the patients have pyelitis; 50 per cent show slight pathological changes in the urine, such as increase in the number of leukocytes, the presence of red blood cells, or albumin and casts, and 30 per cent reveal nothing abnormal in the urine. He says, too, that stricture of the ureter may cause dysmenorrhea, painful coitus, incontinence and menorrhagia. Obviously, the teachings of Kelly and Hunner have contributed much to our appreciation and understanding of the role played by ureteral stricture in the production of pain, especially in women.

The urinary symptoms associated with stricture of the ureter are not constant or typical. The principal symptom is pain. The pain is usually located in the back, beginning near the renal area or in the lateral portion of the lower anterior abdomen, on one side or both. Occasionally a patient complains of pain radiating down the inner aspect of the thigh, or thigh and leg, or more rarely to the outer aspect of the thigh. Pain in the vagina, labia, scrotum, testicle, penis or inner aspect of the thigh is not uncommon. In the more acute cases nausea and vomiting may be present. Dysmenorrhea 3 to 4 days before the onset of the period does occur as a result of ureteral stricture and is relieved by dilatation of the ureter. It is important to note that in these cases intravaginal palpation of the ureter will produce the pain. Vesical symptoms such as dysuria are not necessarily prominent and the presence of hematuria and pyuria are far from constant. Palpation of an ovary will sometimes elicit pain which will cause the surgeon to decide that removal of that gland will result in relief for the patient. The ovary is then removed but the pain persists because the diagnostician did not appreciate that he was exerting pressure upon the ureter coincident with pressure upon the ovary and that the trouble was in the ureter.

Uterine fibroids often lead the general or gynecological surgeon to promise relief of symptoms with their removal. Failure occurs too frequently because success could not ensue in cases wherein the origin of the pain was within the urinary system. A gastrointestinal lesion is often suspected even when repeated x-ray and other routine examinations have shown no evidence of it. Many patients migrate from one physician's office to another endeavoring to rid themselves of abdominal discomfort. Various diagnoses are made, the most frequent one being chronic appendicitis, and too often the urologically conscious surgeon sees the patient only after the appendix has been removed or sundry pelvic operations performed.

Every pelvic examination should include an attempt to palpate the ureters: Rudnick and Cornel[21] describe a technic of intravaginal palpation of these structures. They say: "To palpate the ureters intravaginally one places the internal fingers against the anterior vaginal wall about one inch laterally from the symphysis pubis and about one inch above Poupart's ligament, while the external fingers are brought in contact with those in the vagina. By a rolling motion, one is able to feel the ureter slip between the fingers. In the pathologic case, the pain, of which the patient complains, is thus reproduced. If the pressure exerted between the fingers is increased, the pain may be much more severe than the patient ordinarily experiences. If, however, one is gentle, the pain produced is about the same as that complained of by the patient.

"Another place the ureter can be felt is between the ovary and the cervix in the broad ligament. This is much more difficult than the preceding maneuver."

It should also be remembered that children suffer from ureteral stricture. Lowsley and Kirwin[22] direct attention to the fact that the most prominent symptom in these cases is persistent urinary infection.

Cystoscopic examination in ureteral stricture sometimes will reveal a marked cystitis, but ordinarily there is an absence of bladder findings except that there is usually present a visible hyperemia of the ureteral orifice on the involved side. This finding is sufficiently constant to be a dependable guide as to which side is involved. Many strictures cannot be demonstrated radiographically but are evident upon ureteral instrumentation. It is probably true that the practice of most urologists of using No. 5 ureteral catheters routinely results in the overlooking of many strictures, for many of them manifest themselves only upon the passage of catheters or bougies of a larger caliber. Again, ureteral instrumentation will often result in reproduction of the pain of which the patient complains.

An enigma continues to exist as to the diagnostic differentiation of organic ureteral stricture and of localized nodal spasm, since both exhibit similar diagnostic characteristics upon examination, sometimes even under the influence of anesthesia. Keyser[23] says: "In the ultimate, absolute differentiation of stricture and spasm can be made only by operative or autopsy exposure of the obstructive site." Even so, the rationale of treatment in either case embodies the utilization of conservative measures of treatment such as dilatation and the indwelling ureteral catheter, before more radical measures are employed.

Urinary Tuberculosis.—Renal tuberculosis is second in frequency only to pulmonary tuberculosis. While about 75 per cent of the cases exhibit urinary symptoms the remaining 25 per cent present bizarre and indefinite symptom complexes. The usual features are malaise, slight loss of weight, mild anorexia, nervousness, restlessness, and mental inadequacy, combined with persistent pyelitis and pyuria. In cases exhibiting urinary symptoms they usually are frequency, urgency, and pain and burning on urination. These symptoms ordinarily will have been present for several months and will have become progressively more severe. Renal tuberculosis is probably always secondary and a careful physical examination may reveal the site of the primary lesion. Routine urine examinations should be made and these repeated many times. Such examinations will also include search for acid-fast organisms. The bacilli do not constantly appear in the urine but seem to occur as "showers," and while a positive finding of acid-fast bacilli is conclusive, a single negative finding is not. The examination of the case of suspected renal tuberculosis will be completed by cystoscopy and ureteral catheterization for the collection of selected specimens, and functional

tests, as well as for the making of retrograde pyelograms. Man is susceptible to infection by the bovine type of organism and it is true that the avian type is pathologic for man, though not for guinea pigs. This should be kept in mind when guinea pigs are used in an attempt to isolate tubercle bacilli.

The cases not presenting urinary symptoms may easily produce intra-abdominal symptoms and may be the source of error in diagnosis.

Other Conditions.—Renal ectopia does occur and Davidson[24] says: "It is becoming more generally known that the kidney is a migratory organ and may be found in almost any part of the abdomen. . . . When the kidneys are low in the abdomen or in the pelvis, as in ectopia, the symptoms produced are bizarre and may simulate other conditions such as appendicitis, intestinal obstruction or gynecologic pathology." He further emphasizes the importance of the diagnostician being ever watchful in cases where an atypical abdominal or pelvic mass is palpated, or where the x-ray film shows a shadow in an unusual position. Renal ectopia is a congenital anomaly and must be distinguished from the acquired form of nephroptosis.

Elusive ulcer of the bladder occurs and results in lower abdominal and pelvic pain. Frequently pelvic and other operations are performed for the relief of the symptoms before the diagnosis is correctly made. The urine usually shows nothing abnormal in these cases and the diagnosis is made by cystoscopic examination.

Scherk[25] directs attention to the fact that obscure pathological processes associated with intermittent fever create difficulties in diagnosis, and suggests that perinephritic suppuration should be considered, especially if there is a history of furuncle or carbuncle. Temperature of a septic type, pain in the lumbar region, and tumor more or less distinctly felt on bimanual palpation and not displaceable by respiration, even with negative urine findings (unless the pus has ruptured into the renal pelvis) should direct suspicion to the perinephritic area. Urological radiography should be employed as a diagnostic adjuvant in these cases.

In dealing with traumatic cases it is well to remember that injuries to the kidneys with retroperitoneal hemorrhage may produce the typical symptoms of acute peritonitis. Backus[26] reports such cases and notes that nearly all such cases undergo laparotomy before the proper diagnosis is made.

DIAGNOSTIC PROCEDURES

The necessity for careful history taking has already been pointed out, but the procedure is as essential as the admonition is trite. A history can not possibly be adequate unless serious thought is given to the urinary tract. The necessity for considering the patient as an individual and not a disease entity has been mentioned and I do not believe that a concession to radicalism is made when it is stated that every physical examination should include consideration of the urinary tract. The necessity for radiographic and other evidence of "adhesions," "chronic cholecystitis," "chronic appendicitis," "pelvic pathology," and similar conditions, before we decide to operate for them, has been pointed out. It follows that if those of us who practice general surgery will but become conscious of the urinary tract as a possible source of intra-abdominal symptoms many errors will be avoided, because our suspicions will lead to more careful study of these structures.

Urinalysis. — The simple procedure of careful microscopic as well as chemical urinalysis will frequently point attention in the proper direction. It must be remembered that one normal specimen is not conclusive evidence since abnormal elements such as pus or red cells may be delivered from the kidney only at intervals. I do not believe that this point can be emphasized better than it has been by Edward B. Jones[27] who has said: "Urine examinations are not to be too strongly trusted, for a blocked, infected kidney would provide little or no evidence of the 'boiling pot' until the pressure within forced an admixture with bladder urine of the pyogenic products from the infected renal pelvis." Thus we see that urinalysis, important though it is, does have its limitations and dependence upon this one procedure alone might well lead to error. The common practice of utilizing voided specimens from the female for analysis justifies the comment that only a catheterized specimen from the female is acceptable for study.

Ureteropyelography.—The discovery of Roentgen has contributed much to our ability to diagnose urinary conditions accurately. This is especially true in this day of improved technics and the development of solutions that are safe and nonirritating for both intravenous and retrograde pyelography. This is not the place for a discussion of the relative merits of the two types of pyelography. As a matter of fact, each has its place in the armamentarium of the diagnostician, and the skilled and astute clinician will frequently employ both. However, it is a matter of general agreement that properly timed serial radiographs are essential, and that these be made both in the supine and the erect position if full information is to be obtained. The pelvis of the kidney, the ureter and the bladder are amenable to delineation if the proper technics are employed, and these technics are safe, relatively inexpensive and available to all of us.

Cystoscopic Procedures.—Very often cystoscopic observation will be required to make an accurate diagnosis. Other maneuvers may be carried out in conjunction with this procedure. The ureters may be catheterized and selected specimens of urine taken for study. Selective functional tests of the individual kidneys may also be performed while the catheters are in position, thus providing invaluable information. Retrograde pyelograms may also be made incident to this effort.

SUMMARY AND CONCLUSIONS

Despite refinements and advancements in the field of urological diagnosis, the incidence of error in differentiating lesions in this field from abdominal conditions remains inexcusably high. If this situation is to be improved, physicians generally, and more especially general and gynecological surgeons, must recognize the fact that urological lesions must be considered as possible causative factors in the production of intra-abdominal symptoms. Patients' histories and physical examinations, if they are to be complete, must include a consideration of the urinary system, and additional studies of the organs composing that system must be made when indicated. Such studies will include repeated chemical and microscopic examinations of the urine, blood chemistry estimations, retrograde and intravenous pyelograms made in the supine and erect positions, and the various cystoscopic maneuvers.

Patients must be considered as individuals and not as disease entities or symptom complexes. The approach of the diagnostician must be objective as well as subjective, comprehensive and scientific.

1524 Colorado Boulevard

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Malignancies of the Colon

F. E. HECKER, D.O.

Milwaukee, Wis.

The matter of diagnosis, treatment and management of colon malignancies presents a most interesting and inviting challenge to the surgeon and general practitioner. Too often the study of the colon is passed over superficially by the physician who is ever conscious of liver and gallbladder, stomach or urogenital disease. Nowhere can more lasting and beneficial results be obtained than in the early recognition and treatment of malignancies of the colon.

In reviewing the anatomy of the colon, we must remember that its blood supply comes mainly from the superior and inferior mesenteric arteries. The cecum draws its supply from the ileocolic artery, the ascending colon from the right colic artery, the transverse colon from the middle colic artery (both arteries being branches of the superior mesenteric). The descending colon is supplied by the superior and inferior left colic arteries, and the sigmoid from the inferior left colic artery (both arteries being branches of the inferior mesenteric).

A group of lymph glands around the ileocolic artery drains the cecum and proximal colon; glands in the mesocolon drain the transverse colon, and glands along the branches of the left colic artery drain the distal colon.

The cecum and sigmoid are the most common sites of cancer of the colon. Next in order are the ascending colon and the splenic and hepatic flexures.

Two types of adenocarcinoma invade these regions; a fungating cauliflower mass invading the lumen and an annular growth restricting the lumen. The first is prevalent in the cecum, begins in the mucous membrane, invades the lumen, and speedily ulcerates. The second is prevalent in the sigmoid, infiltrates the bowel wall and, because it is richer in fibrous than in glandular elements, constricts and narrows the lumen forming a "napkin ring" type of deformity. These tumors are smaller than the first and ulcerate late.

Roughly, the colon can be divided into two parts, a right and a left half, with the right being invaded by the fungating cancers, the left by the scirrhous.

While the spread of carcinoma in either side is slow, it is especially slow on the right. Spread is by direct infiltration, by way of the lymph drainage and, in the end stages, the blood stream. Surrounding organs may be involved by direct infiltration, and the tumor mass may become adherent to adjacent tissues. In the end stages, the tumor may metastasize to the liver through portal circulation.

To promote a decrease in the mortality of malignancies of the colon, the general practitioner must make a careful survey of bowel symptoms of the patient. Abnormalities of stool must be studied and these questions asked: Has there been diarrhea, constipation, a change in the size or consistency of the stool? Has there been mucus, blood, or pus?

Tumors of the right colon show alternating diarrhea and constipation with the diarrhea prevalent in most cases. Pain and right-sided discomfort accompany the stool findings. Fatigue and weakness, with an accompanying anemia, are present; and finally, the presence of a palpable tumor mass in the right side may be pathognomonic.

Left colon tumors, being scirrhous in type, more commonly cause obstructive lesions, cramps, obstipation and occasional painful diarrhea; bloody stools are prevalent. Occasionally a mass may be palpated. In patients with left colon tumors the change in the bowel habit is marked.

Swinton and Gillespie, in their discussion of diagnosis of carcinoma of the colon and rectum, list the four following groupings:

(1) Any abnormality of the stool. This includes the presence of blood, pus, or mucus, or any change in the caliber of the stool.

(2) Any change in the bowel habit of an individual. This may mean an increasing or decreasing constipation, diarrhea,

or frequent loose stools. It means any change from what has been for that individual, a normal bowel function.

(3) Any unexplained abdominal pain, cramps, indigestion, or a feeling of fullness.

(4) Any unexplained abdominal tumor or anemia.

It is obvious that these symptom groups might occur in conditions other than malignancies. Diverticulitis, diverticulosis, chronic, stenosing enteritis, tuberculosis, polyps or ulcerative colitis may also cause them. Careful, complete examination can eliminate these disorders as possibilities.

Diverticulosis shows no tenderness to palpation. Twenty-four hour films following barium ingestion demonstrate the single or multiple "bud-like" shadows with blunt ends projecting out of the lumen.

Diverticulitis may be found, by barium enema, to show irregular "saw tooth" markings, in addition to the clinical symptoms of pain and tenderness on palpation. Obstruction occurs and may be complete. Of all lesions, this can be most easily confused with malignancy. In its advanced stage, the indurated, inflammatory mass closely resembles the fixed mass of carcinoma.

Serial films of the small bowel will show chronic stenosing enteritis, with the "string-like" pattern of the barium passing through the small intestine.

Tuberculosis of the ileocecal region is detectable by x-ray. The cecum is irritable and the area involved may show no barium. If an enema is used, the cecum contracts and expels the barium, the process being easily visible under the fluoroscope.

Polyps are best discovered on roentgenologic examination by the contrast air enema. They project into the lumen and are faintly outlined by barium.

Ulcerative colitis shows a high irritability of the colon with absence of haustral markings.

Carcinoma of the cecum shows a filling defect; the mucosal pattern is altered. Sigmoid cancer may show complete obstruction—a "napkin ring" deformity. The lumen is rigid, and there is no fluid change with pressure.

That polyps are definite tumors and may be premalignant must be clearly understood. Unfortunately, most cases of polyps show no symptoms in the premalignant stage. However, 70 per cent of polyps of the colon are demonstrable by the use of the 10 inch sigmoidoscope and, therefore, can be found and biopsies performed, if routine sigmoidoscopic examinations are made. In biopsy of the polyp, removal of the entire polyp is essential to accurate diagnosis.

To establish a diagnosis of malignancy of the colon, the steps in the examination in order of their occurrence and importance are: (1) a careful, exact history; (2) digital, proctoscopic and sigmoidoscopic examination; (3) barium enema and barium meal roentgenography; and (4) careful objective study, abdominal palpation and, if necessary, laparotomy for diagnosis.

Following thorough diagnostic procedure, an even more careful and fastidious preoperative routine must be maintained. Perhaps the most important single factor in decreasing the mortality from radical operation for colon malignancy has been the increased attention paid to proper preoperative management. In almost all of these cases there are marked deficiencies—notably in serum proteins, red blood cells and vitamins—and restitution of normal balance places the patient, hospitalized for colon surgery, in a much more advantageous position. It is natural that patients with melena, severe diarrhea or obstructive symptoms would have a marked deficiency in vitamins, and their replacement becomes even more important when their effect on the re-establishment of proper nutritional energy in the postoperative patient is considered.

There is a standard of protein deficiency. Those patients having a serum protein less than 6.5 grams, or serum albumen of less than 4 grams, to 100 cc. of blood are considered to have serious protein deficiency. It must be remembered that the results of these tests given to patients who have been having the symptoms of melena and diarrhea, or even to those suffering obstructive symptoms, are not necessarily accurate. Only repeated tests—especially after the patient has been given replacement therapy for serum protein deficiency—can establish the actual blood content. Administration of protein in the form of foods such as eggs, steak, etc., has proved to be a slow manner in which to overcome deficiency. Recently, excellent commercial proteins in highly concentrated form have become available, and they aid greatly in raising the protein level when given orally. Parenteral administration of amino acids may give good results, especially when used in combination with a high protein diet and protein concentrates which are also given orally.

Plasma infusions have their place in the quick elevation of serum protein, but it must be remembered that a large quantity of this type of protein is necessary to elevate the protein content of the body appreciably.

Perhaps the best of all devices to raise the level of protein in the body, and undoubtedly the quickest, is whole blood transfusion. In routine care never less than 2000 cc. are administered and, in many cases, as much as 10 liters before surgery. Naturally, whole blood transfusions will alleviate another of the typical symptoms of colon malignancy, anemia.

It is highly recommended that hurry be dispensed with in scheduling surgery for colon malignancy except where complete obstruction exists, and that a most thorough and careful study of body activity and energy be conducted before surgery is attempted. There are several means by which immunity to contamination may be developed besides that of whole blood transfusions. Succinyl sulfathiazole may be used up to a week before surgery. Three grams four times a day should be given. Some clinics use no preoperative antiseptic medication. The day before surgery, the bowel must be thoroughly emptied by enemas, and it is highly recommended that a Levine tube be used to decompress the upper bowel, and to prevent postoperative distention. It is my opinion that the Miller-Abbott tube serves no real purpose in decompressing those lesions of the colon which are obstructive, if there is competency of the ileocecal valve.

Choice of operative procedure depends (1) upon the nature of the lesion and its extension; (2) upon the skill of the operator and his team; and (3) upon the condition of the patient. There is one inflexible rule in the operation of any colon malignancy, and that is: For a successful result in surgery of colon malignancy, the procedure must be radical. In those lesions restricting themselves to the cecum, an ileocolostomy with end-to-end anastomosis in a one-stage procedure may be performed. Should the patient's condition necessitate it and the tumor mass be too highly ulcerative and inflamed, this operation may be performed in two stages with the tumor mass being removed at the second stage.

Lesions of the transvere colon may be excised, if small, and end-to-end anastomosis of the well bowel made. Lesions of the descending colon and upper sigmoid may be resected, with end-to-end anastomosis following. Two important safeguards must be followed: The involved colon must be mobilized and the blood supply to the well bowel protected.

The Lahey clinic holds that a modification of the Mikulicz operation proves best at their hands in the radical amputation of colon malignancies. There is no doubt that this operation is best for the inexperienced or occasional operator, for it automatically predisposes to decompression of the involved bowel. However, the method of operation as performed by the Lahey clinic must include radical dissection to be effective, and Lahey stresses the fact that this objective is gained only by adequately mobilizing the parts of the colon involved. It is true that improved technics have made possible the management of these two-ended colostomies following surgery, inasmuch as time is no important factor in the treatment of cancer of the colon. This procedure can be used with great advantage on many of the more difficult malignancies.

Those patients who enter the hospital with obstructive lesions causing marked distention and sometimes peritonitis, and who are in poor preoperative condition, must always be decompressed before surgery. Several clinics stick to the belief that a Miller-Abbott tube introduced into the ileum is effective in this reduction of distention, but perhaps all will agree that a more adequate decompression can be obtained by transverse colostomy, which operation is simple to perform even to the closing of the wound following the resection. Here again, hurry is not essential, for following the transverse colostomy, the patient may be carefully studied and slowly built up to an operative state.

Postoperatively, the same principles which hold true for preoperative preparation must again be considered. Adequate serum protein balance must be maintained. Anemias must be fought and infection carefully avoided. Succinyl sulfathiazole, sulfadiazine intravenously and penicillin have aided materially in decreasing infection morbidity. Nutrition plays an important part in postoperative care. It must be remembered also that careful postoperative check-ups for a period of years must be made.

In summarizing, may I say that in the field of colon malignancies, diagnosis rests with the general practitioner whose careful studies can discover these abnormalities early in their existence for reference to the surgeon. A meticulous study of the patient, and an equally careful preparation before surgery, have done much to reduce surgical mortality and increase the life span of those operated upon for this disease. The type of surgery performed depends to some extent upon the skill of the operator, but always it must be remembered that the most successful result is from the radical operation.

2218 N. Third Street

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DISCUSSION

R. J. DENNIS, D.O., Milwaukee, Wis.: The characteristics of the two principal types of malignancies of the colon, adenocarcinomata and scirrhous carcinomata, have been well covered by Dr. Hecker.

Due to the insensitiveness of visceral peritoneum, these tumors may develop to enormous size before pain is produced. Not until the growth becomes of sufficient size to cause interference with function and partial obstruction is there any indication of abnormality.

The tumor grows from the mucous membrane of the bowel, and in three-fourths of the cases is annular in type and causes narrowing of the lumen until partial or complete obstruction occurs. The partial obstruction of the lumen causes dilatation of the bowel proximal to the neoplasm with resultant fecal impaction. This is an important characteristic to look for during the fluoroscopic examination while introducing the barium enema. As the area of deformity of colonic neoplasms is relatively short, it is also necessary to watch closely for a sharply defined transition from normal to abnormal bowel.

Another diagnostic sign of colonic neoplasm is the difficulty encountered in passage of the retrograde barium past the diseased portion of the colon. It is to be remembered that tumors which completely obstruct the reverse flow of the enema may permit the fecal stream to pass in the normal direction with little or no interference.

Pedunculated carcinomatous growths which spring from one side of the gut and project into its lumen but do not necessarily obstruct do not cause any change in its caliber. Here it is of vital importance to inspect carefully any filling defect that may be seen and to endeavor to outline it clearly. This may best be accomplished by using the air-barium contrast enema.

Characteristic findings to be looked for on the radiographic plates and during fluoroscopy are as follows:

1. An abrupt change from normal bowel configuration to one of stenosis, the stenosis usually being of rather short length and preceded by colon dilation with or without fecal impaction.

2. Abnormality of the mucous membrane due to carcinomatous changes which can be seen involving the filling defect and adjacent membranes of the bowel on either side.

3. Difficulty in producing retrograde flow of the barium enema through any part of the colon.

An associated palpable mass is a valuable auxiliary sign.

Consideration must also be taken of colonic polyposis which in many instances causes future bowel malignancies in the person so affected. Many colon polypi are precancerous in nature and finding them constitutes an indication for a thorough examination. They are usually best demonstrated as negative filling defects seen on the double contrast plate. The barium clings to the normal mucous membrane outlining it, with the exception of the polypi which are small pedunculated masses arising from the underlying membrane. This causes a characteristic punched-out appearance of the barium, the size of the filling defects being dependent on the size of polypi.

953 N. 27th Street

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Vaginal Hysterectomy with Clamps

HOWARD E. LAMB, D.O.,F.A.C.O.S.

Denver

The first well-planned vaginal hysterectomy was outlined by Langenbeck in 1813, and although the operation has been performed by many since that time, Joseph Price probably has done more to popularize the procedure than any other man in this country. Not until James William Kennedy, surgeon-in-chief of the Joseph Price Hospital in Philadelphia, and Archibald Donald Campbell published their work on vaginal hysterectomy[1] did this country have opportunity to give serious consideration to the value of the operation.

There are a number of reasons why surgeons of any great experience have given serious consideration to vaginal hysterectomy as opposed to the abdominal operation. It has been estimated, from records of the operation obtained from hospitals throughout the United States and Europe, that the mortality rate for supravaginal hysterectomy is approximately 4 per cent. The majority of this mortality are best described as "sudden deaths." The patient has had a normal postoperative recovery without signs of shock or infection and, for no apparent reason, suddenly expires.

This occurred often enough in my experience that I became suspicious of my operative technic and wondered whether an improvement in my operative skill would not prevent these sudden deaths. No one, so far as I know, has yet been able to explain why a patient who has been operated upon for the removal of a fibroid uterus should die suddenly without any apparent cause.

Another very important reason for giving consideration to vaginal hysterectomy is the occurrence of carcinoma in the remaining cervix after a supravaginal hysterectomy. I was one of those who, because of statistics published on the development of carcinoma in the remaining cervix, felt obliged to do a total hysterectomy. Now my opinion is that the total removal of the uterus as an abdominal operation will create a death rate greater than the mortality rate from malignancy which may develop in the remaining cervix.

Frank Lahey, of Boston, states in a recently published article[2] that the mortality rate for total extirpation of the uterus is too high to justify the operative procedure simply because malignancy will develop in the remaining cervix after supravaginal hysterectomy in a certain per cent of the cases.

It is probably safe to state that the average surgeon's mortality rate for abdominal total hysterectomy, including the sudden deaths, approaches 7 per cent. I realize that many will not agree with this statement, especially the aspiring young surgeon who has had too many early victories. Price, while discussing vaginal hysterectomy, made the statement that in over 4,000 operative procedures which had been performed in hospitals and homes, he had an operative mortality of less than 1 per cent. The experiences of Price, plus those of Kennedy, in a series of well over 11,000 hysterectomies performed by the vaginal route, show an operative mortality of less than 1 per cent. In no instance did they experience the sudden death which is so common in the abdominal operative procedure.

Any unbiased surgeon who still does his own thinking and who is not harnessed in his choice of operative procedure by the present-day popularity of standardization, should be aroused by simply comparing the death rate of hysterectomy by the abdominal route with that following vaginal hysterectomy.

One should be impressed further by the experiences of the late Joseph Price,[3] who, having performed a greater number of vaginal hysterectomies by the clamp method than any other man in America and probably in the world, said, "Vaginal hysterectomy clamp method has the broadest field of usefulness of any pelvic operation. It has the lowest operative mortality of any major surgical procedure, and has the best postoperative history of any operation of my experience."

With this in mind, I decided about 5 years ago to perform at least 100 vaginal hysterectomies by the clamp method to determine the value of this type of operation in my hands and to evaluate the relative merits of the two operative procedures. That series has now extended well beyond the 250 mark. So far, I have had no operative deaths, and but two operative accidents. In one I opened into the bladder, and although the wound in the bladder was repaired at the time of the operation a vesicovaginal fistula developed. The other operative accident, unfortunately, was on the wife of a physician. In this instance we had a perforation of the bowel during delivery of the fundus of the uterus through the vaginal wound.

No surgical procedure is without its pitfalls, and everyone naturally will experience these in connection with vaginal hysterectomy by either the clamp or the suture method. Among those I have encountered have been two cases in which the uterus had been suspended at previous operation, preventing the delivery of the fundus through the vagina. It was necessary to open the abdomen from above and free the fundus from the anterior abdominal wall before the operation could be completed.

Although ventral fixation of the uterus is not a contraindication to vaginal hysterectomy, the operative procedure is made far more difficult if one has been done. An inexperienced surgeon should not attempt vaginal removal if the uterus has been previously suspended.

INDICATIONS FOR VAGINAL HYSTERECTOMY

I am of the opinion that any lesion of the cervix or uterus which is precancerous in character indicates vaginal hysterectomy. In many instances early malignancies of the cervix are missed even under biopsic examination, and the lesion is treated by electrocauterization. This conceals the development of the carcinoma until it has reached an inoperable state. A badly lacerated cervix which is eroded or has undergone a cystic degeneration, in a woman who is past the childbearing age or at the menopause, is best treated by complete vaginal removal of the uterus.

Intermenstrual bleeding from the uterus usually arouses suspicion that malignancy of the fundus may be present. In the past, when diagnostic curettage and pathological report of the tissue removed showed

no evidence of malignancy, these suspicions were lulled. The lesion, which can easily be overlooked even with a diagnostic curettage, then develops to that place where it is not amenable to surgery or radiation therapy.

I recommend vaginal hysterectomy in all cases of suspected malignancy of the cervix or uterus, without waiting for a positive pathological report of tissue removed from the cervix or other uterine location in women who are beyond the childbearing age.

Fibroid Uterus.—Many surgeons feel that it is impossible to remove a relatively large fibroid uterus through the vagina, because they assume that its size would prevent delivery by that route. Actually the ease with which a really large uterus can be delivered into the vagina is surprising. If the fibroid tumor is of exceptional size, morcellation is necessary. The mutilation is all of tumor tissue and produces no trauma to the patient.

Polyp of the Cervix.—This is another indication for vaginal hysterectomy. Statistics indicate that more than 50 per cent of women beyond the age of 45 who have uterine polypi later develop malignancy of the cervix. For that reason alone it is unwise to remove a uterine polyp and cauterize the cervix. Some months later, to his sorrow, the surgeon often finds a well-developed malignancy at the site of the polypectomy.

Procidentia.—I have found no better operative procedure for the treatment of procidentia than vaginal hysterectomy with clamps. The operation is so simple and the results so spectacular that I do not hesitate to advise it even on women 75 years of age. The results obtained are apparently due to the fact that once the broad ligaments and the vagina are severed from the uterus, the retraction of the pelvic fascia is toward the lateral pelvic wall. The retracting fascia carries with it the vaginal mucosa and reestablishes what appears to be a quite normal vaginal vault. The marked cystocele which accompanies complete prolapse of the uterus can readily and immediately be repaired following the vaginal hysterectomy. With the repair of the cystocele, these women lose most of their discomfort.

Hemorrhage.—Excessive loss of blood from the climacteric uterus is further indication for vaginal hysterectomy. The uterus is removed in these cases largely because of the beneficial psychological effect produced upon the patient and to prevent the development of malignancy. Too often these women are treated symptomatically, and one of the many endocrine products is used to control the bleeding. Such therapy is superficial and provides a time interval for the development of a malignancy which cannot be effectively treated later. Vaginal removal which includes the cervix will prevent the development of malignancy. Supravaginal subtotal hysterectomy leaves tissues in which malignancy may occur. Many supravaginal hysterectomies have been and are still being performed. Development of malignancy in the remaining cervix is always a possibility, especially in a case where a fibroid uterus has been removed supravaginally. Any suspicious lesion of the remaining cervix should be removed by the vaginal route, with clamps.

The decreased incidence of ovarian disease is notable following hysterectomy by the vaginal clamp method as compared with the abdominal method. It is simple to remove a diseased ovary at the time of vaginal hysterectomy. One additional clamp is placed behind the attachment of the ovary to the broad ligament.

Kennedy reports a series of 6,000 hysterectomies in which the uterus was removed vaginally by the clamp method, without removing either ovary. His records show that only one patient returned for any type of ovarian growth. The influence of vaginal hysterectomy in preventing future ovarian growth is still only a statistical indication that such influence exists. It is entirely possible that the remaining cervix stimulates ovarian growth or the development of ovarian disease. In any event the inexperienced surgeon removes far more ovaries than necessary, usually because of the presence of enlargement or retention cysts of the organ. As a result, many women are castrated and suffer all of the ill effects of artificial menopause, because the ovary is easy to remove and freely accessible through the open abdomen.

A contraindication for vaginal hysterectomy is fixation of the uterus by parauterine adhesions. Any adhesion or growth which causes a thickening or inelasticity of the broad ligament naturally prevents the delivery of the uterus through the vagina. No surgeon should attempt a vaginal hysterectomy until, by careful examination, he has determined that the uterus is freely removable. Since there is little or no shock following the operative procedure, secondary anemia is not a contraindication as it would be in the abdominal operation. The patient often can be operated upon safely with a light ether anesthetic when the blood count is as low as 3,000,000, since abdominal relaxation is not a problem. Because the upper portion of the vagina is not closed, adequate drainage, even in the case of an infected uterus, is provided. Uterine infection, under ordinary circumstances, is a contraindication for the abdominal operation.

It is not uncommon to complete a vaginal hysterectomy by the clamp method in 8 to 10 minutes, without attempting to break speed records. Laceration of the perineum often coexists with disease of the uterus and, in good operative risks, the reconstruction of the pelvic floor can be carried out at the same time.

The whole operative procedure, including the removal of the uterus and the reconstruction of the pelvic floor, does not consume over a half hour of operative time. The complications in this type of operation are injury to the bladder or ureters or damage to a loop of small bowel which may have herniated into the pelvic cavity. It is not uncommon to find, after the vaginal wound has completely closed, that the fimbriated end of one of the fallopian tubes has herniated into the vaginal wound and is giving the impression that there is malignant growth. This is a cause for continued vaginal discharge following vaginal hysterectomy with clamps. The complication is not serious and is simple to remedy. I have treated several without anesthesia. However, since the fimbriated end of the tube which has become incorporated into the vaginal scar must be destroyed by cautery, a somewhat painful procedure, I now cauterize the tissue under intravenous anesthesia. It is astonishing to observe the end results 6 to 8 weeks following the operation. An operative procedure which appears to be so crude and leaves such a normal appearing vagina is a constant source of surprise. There is apparently no shortening of the vagina following vaginal hysterectomy by the clamp method. Vaginal shortening following abdominal panhysterectomy has always been one of the more serious complications of that method

because it seriously interferes with normal sex life.

Following application of the clamps and removal of the uterus, a large vaginal pack is placed in the wound as far as the end of the clamps. An indwelling catheter remains in the bladder for a period of 48 hours following surgery. Under a light intravenous anesthesia on the morning of the second postoperative day, the pack is removed. The clamps are released also under a light intravenous anesthesia at the end of the third postoperative day, or 72 hours following surgery. When the clamps lie free in the vagina, usually on the fourth postoperative morning, they are removed. The patient remains in the hospital for a period of 16 days, because the sloughing which takes place in the tissue where the clamp has been applied has a tendency to bleed about the twelfth day. The longer hospital stay is not caused by the patient's physical condition or the seriousness of the operative procedure, but to prevent unnecessary bleeding following the sloughing at the site of the clamps.

In the majority of cases, the vaginal opening is closed and drainage has completely subsided at the end of 3 weeks.

Lamb Memorial Hospital
1560 Humboldt Street

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DISCUSSION

EARL H. GEDNEY, D.O., AND DEWAINE L. GEDNEY, D.O., Bangor, Me.: We recommend Dr. Lamb for his paper so well presented. We cannot fully evaluate vaginal hysterectomy by the clamp method since we use the suture method in the comparatively small number of hysterectomies in which we use the vaginal approach. Like Dr. Lamb, we were impressed by Kennedy's book and digested its contents with interest. We use a modification of the technics of Campbell and others and have performed almost 500 vaginal hysterectomies to date. It has been the policy in our hospital to demonstrate the clamp method in a small number of hysterectomies each year for the instruction of internes.

Our mortality rate is higher than Dr. Lamb's, but compares favorably with Kennedy's statistics from use of the clamp method. Our ratio of accidents is somewhat better, perhaps due to the longer series. We have had the same accidents, yet it is our impression that one is far less liable to injure the bowel by way of the vaginal route than through the abdomen, since it is such a simple matter to wipe the bowel from the uterus at the introitus.

It is true that vesicovaginal fistula occurs more frequently after vaginal than after abdominal hysterectomy even with the most careful and painstaking dissection. We believe one reason may be that trophic disturbances sometimes follow the trauma consequent upon separation of the bladder from the uterus, or that following use of the retractor, since we are almost positive we did not invade the bladder. Up to the present we have had four such fistulae.

We have not found very much retraction of the fasciae, carrying with them the vaginal mucosa, which is said to follow operations in which the clamp method is used, and which may be one of the advantages over the suture method.

We agree with the indications as set forth and find little to disagree with except the term "suspicious lesion." In the diagnosis of suspicious intrauterine lesions we are relying increasingly upon the roentgenologic uterogram done with opaque oil, and for the cervical lesion we do not hesistate to make a biopsy and to advise radical surgery in the first stage. Prophylactic hysterectomy may or may not have its place.

We do not encounter prolapse of the tubes since we remove them at surgery. Our vaginal pack is removed under sedation the day following surgery. Our patients are mobilized on the second day, with bathroom privileges on the third day unless there is active vaginal bleeding which occurs quite seldom, especially after ligation of the uterine arteries. They are discharged from the eighth to the tenth day if all goes well. Our morbidity from cystitis runs rather high, but principally in those cases in which large cystoceles require repair (that involvement is found in a large majority of those cases operated upon).

It was the pleasure of one of us (Dewaine L.) to talk with and to observe the work of Leonard Averett in Philadelphia last April. He now has statistical data on over 3,000 vaginal hysterectomies and has truly been a pioneer in the field. His mortality (¼ per cent) also is of the same exceptionally low rate reported by others. An article[1] on his work was published recently.

Bangor Osteopathic Hospital

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The Vaginal Approach to Pelvic Surgery

SAM F. SPARKS, D.O.
Dallas

The vaginal approach to pelvic surgery has not received the attention it deserves. Largely through lack of experience and a relative unfamiliarity with the surgical anatomy involved, the average general surgeon has neglected, or even rejected, transvaginal technics which are equal or superior to corresponding abdominal methods. This presentation is intended as a plea for more frequent employment of the vaginal route, and a discussion of the advantages, disadvantages and technical procedures involved.

A review of the literature has been omitted since reports pro and con can always be found in reference to any operative controversy. Suffice it to say that the writings of the past 5 years indicate a definite trend toward greater utilization of vaginal rather than abdominal operations on the pelvic viscera.

Opponents of vaginal surgery have listed the following objections, most of which are open to challenge:

1. "You're working in a hole and can't get exposure." In most cases experience will show that exposure, facilitated if necessary by a simple episiotomy, is actually better than working deep in a pelvis through an abdominal incision. This is especially true in the obese patient with poor relaxation.

2. "If you run into bleeding you're lost." This objection might be raised to any procedure—pelvic or otherwise—and bleeding can be prevented by adequate understanding of the surgical anatomy involved and careful hemostatic technic.

3. "There is greater risk of injury to the bladder and ureters, and more postoperative urinary difficulty." This is not shown by reviews of large series of cases.

THE ADVANTAGES OF PELVIC SURGERY

The following advantages to pelvic surgery are self-evident and well borne out by clinical experience:

1. Morbidity and mortality are decreased. Reported series in which the morbidity and mortality from vaginal hysterectomy, for example, are shown to be higher than following abdominal hysterectomy will

usually be found to include only small numbers of vaginal operations.

2. There is less shock (if only the result of less handling of the intestines), less postoperative distension and debility, less need for narcotics and a smoother and more rapid convalescence.

3. Of some importance to the patient is the fact that the uncosmetic abdominal scar and possible postoperative hernia are entirely done away with.

4. Finally, when indicated, vaginal hysterectomy offers a safer, simpler means of removing the entire uterus and repairing the coexisting vaginal relaxation so frequently present. In this connection, there is ample reason to criticise the practice of doing an abdominal hysterectomy and then turning the patient over to do a vaginal plastic procedure, when the two operations can be done simultaneously by way of the vagina in approximately half the time.

INDICATIONS FOR VAGINAL APPROACH

There is at least one absolute indication for the vaginal approach to pelvic pathology. Pelvic abscesses which can be reached vaginally should be drained vaginally. Such abscesses are usually the result of free pus collecting in the cul-de-sac or of a tubo-ovarian abscess which has prolapsed and become fixed behind the uterus. In either case, the abscess has walled itself off from the general peritoneal cavity, and simple vaginal incision and dependent drainage usually result in dramatic recovery. On the other hand, abdominal drainage constitutes a deliberate contamination of the peritoneal cavity and cannot be too strongly condemned.

Similarly, needle aspiration or incision of the cul-de-sac is a valuable procedure in the differential diagnosis of pelvic inflammatory disease and ectopic pregnancy. In the former case, pus is obtained, and the incision is enlarged to permit adequate drainage; in the latter case, free blood is aspirated and the indication for laparotomy is clear.

Vaginal ligation of the fallopian tubes, done independently or at the time of a vaginal plastic procedure, is a relatively neglected but effective means of producing sterilization. Each tube in turn is pulled through the colpotomy opening, tied or resected and replaced in the abdominal cavity, after which the peritoneum and vaginal mucosa are closed.

CONTRAINDICATIONS TO VAGINAL APPROACH

There are certain rather obvious contraindications to vaginal operation, all of them applying to technics which involve entering the peritoneal cavity or, more specifically, vaginal hysterectomy. Enlargement of the uterus, sufficient to interfere with its delivery through the vagina, may be considered a contraindication. Some operators have advocated vaginal removal piecemeal of large uterine tumors, but the technical difficulties involved hardly justify such practices.

Pelvic inflammation or endometriosis with dense adhesions may produce obscure distortions of anatomy and make the vaginal approach inadvisable.

Likewise, care should be exercised in the patient who has had previous pelvic surgery.

While vaginal approach has its merits, these contraindications have received too little notice in the writings of the enthusiasts for vaginal surgery. The neophyte, not knowing about or not diagnosing such conditions, embarks on some vaginal procedure and immediately runs into trouble. He then becomes a strong opponent of vaginal surgery. The trouble lies in the choice of procedure and not in the technic itself.

VAGINAL RELAXATION AND UTERINE PROLAPSE

The simple but classical study of Mengert[1] has removed all doubt as to the identity of the tissues which support the uterus in the pelvis and prevent its vertical descent. This study, which is highly recommended to all students of the problem, consisted of measured downward traction on the cervix of cadavers, measuring on a centimeter scale the amount of descensus produced by division of various structures. Bilateral division of the round, ovarian, infundibulopelvic and upper third of the broad ligaments produces little or no descent of the uterus in the pelvis. On the other hand, division of the lower two thirds of the broad ligament, and more especially the upper two thirds of the paravaginal fascia, in every case produced complete prolapse of the uterus. No appreciable prolapse occurred so long as any part of the parametrial or paravaginal tissues remained intact. In two cases, complete prolapse occurred on division of these tissues although the round ligaments had been left uncut. The uterus literally fell through the vagina, pulling the round ligaments after it.

In spite of these fundamental anatomic considerations one still finds surgeons trying to correct vaginal or uterine prolapse by means of various abdominal procedures, such as round ligament uterine suspension or other technics which completely ignore the parametrial or paravaginal structures.

It is thus quite apparent that any procedure intended to correct vaginal wall prolapse, with or without varying degrees of uterine descensus, must include the imbrication or tightening of the paravaginal and the parametrial tissues. To reach the latter, the bladder must be dissected from the anterior surface of the uterus and lower broad ligaments.

The most satisfactory procedure embodying these principles is the so-called Fothergill or Manchester operation. In brief, this technic involves the repair of the anterior vaginal wall, thus tightening the paravaginal fascia and suturing the lower portions of the relaxed broad ligaments in front of the uterus, thus taking up the slack. There are few plastic procedures, vaginal or otherwise, which give such a high incidence of success.

A word is in order regarding vaginal hysterectomy for the treatment of vaginal relaxation or uterine prolapse. Consideration of the anatomic facts already mentioned will show that removal of the uterus is hardly indicated in the treatment of vaginal herniation. No one recommends the removal of a loop of bowel which prolapses through the inguinal ring, unless the bowel is so diseased that removal is mandatory. Equally illogical is the removal of the uterus which has herniated through relaxed paravaginal tissues, unless there is disease of the uterus. If hysterectomy is necessary, the Mayo operation, which combines vaginal hysterectomy with the vaginal repairs already described, is the natural procedure of choice. But the indiscriminate removal of normal uteri in the course of other procedures, whether done vaginally or abdominally, cannot be defended on any grounds.

Sparks Clinic and Hospital
500 Ross Avenue

REFERENCE

1. Mengert, W. F.: Mechanics of uterine support and position; factors influencing uterine support; experimental study. Am. J. Obst. & Gynec. 31:775-782, May 1936.

DISCUSSION

J. GORDON HATFIELD, D.O., F.A.C.O.S., Los Angeles: Dr. Sparks is to be congratulated upon the able manner in which he has presented his views regarding the vaginal approach to pelvic surgery. Many of us, as general surgeons, have been content to continue the abdominal approach simply because we are more familiar with that procedure.

Indications toward an increase in the use of the pelvic approach must be regarded with some apprehension. Undue enthusiasm on the part of the well-trained surgeon may result in abuse of the technic by the unskilled.

Advantages of the pelvic approach are clearly stated by Dr. Sparks. Certain disadvantages must be stressed.

1. Pelvic disease is often associated with abdominal disease. Vaginal approach naturally permits limited abdominal exploration. Cecum, appendix, gallbladder and sigmoid are worthy of routine examination.

2. Early malignancy occurs most often among women in the age group requiring pelvic surgery.

3. Pelvic abscesses should certainly, if accessible, be drained through the posterior cul-de-sac. Secondary surgery, later, for the removal of damaged tissues is best accomplished by the abdominal route. Omental and intestinal adhesions to pelvic structures contraindicate vaginal approach.

No patient deserves more consideration than the woman presenting uterine prolapsus, cystocele and rectocele; part of the price paid for bearing offspring. Here, bladder advancement, imbrication of paravaginal and parametrial tissues with correction of the cystocele with perineorrhaphy are essential. In my own hands, such vaginal work combined with plication of the uterosacral ligaments and a Simpson-Gillian-Crossen suspension has given excellent results. Subsequent childbearing has been without unfavorable incident.

Interesting is the fact that Dr. Sparks has not mentioned the Watkins "interposition operation," which, in my estimation, is anatomically incorrect and contraindicated.

3200 W. Sixth Street

Staff Organization in Osteopathic Hospitals—As I See It!

HOWARD B. NORCROSS, D.O.

Medical Director, Doctors' Hospital, Inc.

Los Angeles

Staff organization is not a newcomer to the field of medicine. We find evidence of its existence in some of the earliest hospital records and histories. Organization of some form of staff began because of the needs, which were much the same in days gone by as they are today. These needs may be summarized in a brief general statement:

To achieve close association of professional men who have a common interest, a common goal and similar training and experiences so that they may exchange their experiences for the common good. It must promote the welfare of the hospital, its patients, nurses and attending physicians. It must develop efficiency and high standards of scientific medical (which term includes osteopathic) and surgical practice in the hospitals among the members of the profession; and it must act in an advisory capacity to the board of directors of the hospital on medical and surgical questions.

The advance of science in general, of medicine, of hospital facilities and diagnostic procedures has been such that the individual physician or surgeon is no longer self-sufficient in the practice of his profession, and must of necessity call upon those with whom he is associated, who possess special knowledge and skills. He must also avail himself of the apparatus and the services of highly trained technicians. Organization of the medical staff of the hospital must, therefore, be undertaken with clear purpose and intent.

The general plan of organization, in my opinion, should cover three main divisions: The governing body, executive board of trustees, and the medical staff.

The governing board should be composed of those responsible for the creation and maintenance of the hospital. They should be representative of the health and medical interests of the community. They should be charged with the responsibility of the welfare of the institution and of the community which it serves. The efforts of the governing board, guided and aided by the professional members of the organization, should deal with procedures for proper staffing, good management and correlation of all hospital functions.

The board of trustees or executive board should be composed of osteopathic physicians and surgeons and laymen who are primarily interested in the hospital which they intend to serve. They should be outstanding men, both in their professional achievements and organizational ability. It is necessary in hospital operation that they be intimately familiar with the professional problems of the staff members and patient requirements. It seems to me that the best results could be accomplished if the members were selected from the specialized services, as well as from the general practice physicians and surgeons, and laymen with business and hospital experience.

Some of the chief duties of the executive board would be: To establish rules, regulations and bylaws for the staff of the hospital; to establish qualifications; and to provide for careful selection and appointment of qualified professional members, and to act in an advisory capacity to the governing board.

The selection of members of the medical staff of the hospital is a subject which deserves much careful thought. Various methods have been used by hospitals throughout the United States at various times, and under various economic conditions. The prime responsibility of the hospital is to the patient it serves, and all action should be directed toward his interests. The policy relating to professional members should not be influenced by economic adversity or any other factor except merit.

During periods of depression, with low patient-bed occupancy, it was the policy of some hospitals to offer membership to physicians of other hospitals with large patient loads, in the hope that a portion of their patients would be transferred to the offering hospitals. In some cases special privileges also were granted. This practice is unjust and most certainly breeds ill

will, and justly so. Unfair and unjust competition, with all of its undermining reactions, were the discouraging results.

The bylaws must provide minimum requirements for admission to the staff of those who would be listed for general practice, or for obstetrics, anesthesia or any other one of the specialties, in a clear, precise, fair and impartial manner. The bylaws must provide for methods of election to membership, establish privileges of practice according to skill, ability and achievements, and provide for advancement of members from limited to greater privileges as those requirements are met. Bylaws and regulations should be so well organized that every member of the staff will willingly bend his efforts to abide by their provisions. They should be fully understood, and the reasons for each provision analyzed. These considerations will establish pride of membership in the organization to which the physician is privileged to belong.

Good staff organization will provide for regular staff meetings. A certain per cent of attendance should be required to maintain active status. These meetings must be planned to be of special interest to all members. The program director should develop his speakers and subjects so that they will deal with hospital activities, cases of special interest, statistical reports of mortality and morbidity within the hospital, bed patient loads, trend of treatment, surgical procedures, anesthetics, use of new equipment, new diagnostic procedures, use of x-ray in diagnosis and treatment, autopsy reports, and pathological conferences. These programs should be entirely different from the type of program presented at other professional group meetings. They should stress the development of trust and confidence among the members of the organization for each other and stimulate interest in the activities of the various professional groups.

It is an excellent plan to have some form of publication, such as a monthly bulletin, to keep all members informed of hospital activities. The publication should carry such matters of information as affect the staff or the hospital, such as new bylaws, insurance problems, new equipment, changes in procedure, matters of personal interest, per cent of bed occupancy, number of turnaways, announcement of programs, changes in personnel and various other items of general interest.

The following outline is submitted as a minimal structure for the organization of a hospital staff:

I. Requirements for membership

II. Classification of membership
  1. General Practice
  2. Surgery
    A. Senior or certified
    B. Associate
  3. Specialties
    A. Certified
    B. Associate

III. Courtesy Group
  1. Specialists not regular members of the hospital staff
  2. Provisions for members of other professions, such as dental surgeons

IV. Officers and Committees
  1. Chairman, or Chief of Staff
  2. Chief of Service of the various branches of special practice, i.e., anesthetics, obstetrics, surgery, etc.
  3. Program Director
  4. Records Committee
  5. Credentials Committee
  6. Ethics Committee

V. Rules and Regulations of Procedure

One sees a good example of a well-organized staff when he enters an osteopathic hospital and enjoys the privilege of watching a smoothly operating surgical team. Because of the regulations that have been established, the members of the team arrive in the hospital and report to the surgical supervisor that they are all present and prepared to start at the scheduled hour. The surgical nurses and the interns, because of staff rules and regulations, are ready to perform their duties and have the patient ready at the appointed hour. The rules and regulations have removed all doubt about the qualifications, skill and ability of those who are to perform the task at hand. The instrument nurse knows that the surgeon, the assistant and the anesthetist must be well qualified to be members of this well-organized hospital staff. The surgical operating team knows that the nursing team and the interns must also be well qualified to be employed by a hospital which maintains the standards required. The whole group works in a smooth, chronological manner, and the surgery begins and ends with each having perfect confidence in the others, with ease of accomplishment and the finest of end results for the patient.

Loyalty of the physician or surgeon to his hospital is a natural outgrowth of good organization. This loyalty, of course, must be established on the part of the hospital towards every member of its staff. A few years ago, before staff organization was as well developed in osteopathic hospitals as it is today, physician-hospital interrelationship and loyalty was comparatively poor. This fact is in no small way responsible for our present lack of greater hospital facilities. As physicians and surgeons, we have come to realize that development of our profession depends directly upon the growth and development and quality of our hospitals.

The hospital has a right to feel that it, also, will benefit by having an organized staff. One of the greatest assets a hospital can have is a well-controlled staff. Through the medium of such a staff, the hospital has the opportunity for exchanging ideas with the professional group as a unit. Through this exchange of ideas, logical reasoning can be accomplished which will result in improved economy and service. Good physician-hospital relationship and understanding will aid the hospital in such matters as procedure of patient admittance, deposits required, hours of attendance, method of discharge of patients, promptness and care of detail in writing of orders, dismissal of patients and completion of records.

When methods and procedures have been carefully studied and agreed upon, it is relatively easy to establish a routine that will save both the physician and the hospital employees much time and energy. It is then simply a matter of mutual cooperation and understanding, and a willingness to work together for the common good.

All patients like to feel that they have certain rights and privileges. They want to feel that each will be treated fairly and equally. Each patient wants to feel that every privilege granted to any other patient

will be granted to him. However, few if any wish to infringe upon the privileges of others.

What better assurance can be offered to the patient than the fact that this hospital to which he is going has a well-organized staff with rules and regulations which have been carefully studied and planned for his benefit. The physician himself, as a member of the staff, has been instrumental in providing these rules and regulations for the protection and benefit of patients. The time and length of visiting hours, age of visitors, number of visitors permitted and all other matters pertaining to the relatives and friends of the patients have been carefully studied and planned for the greatest convenience of the patient compatible with safety.

The more willing the physician is to make these rules known and to discuss them freely with his patients, the more surely the patients will have confidence in both the hospital and the physician. When the physician attempts to tell the patient that he will obtain some special privilege which is in violation of the regulation, he will not succeed in flattering his patient but will undermine confidence not only in the hospital but also in himself.

The physician and surgeon has a right to expect that he, personally, will gain because of the organization of the staff to which he belongs. The practice of medicine is becoming a more exact science with each passing year. The members of the profession are becoming more highly skilled in their respective fields and have a right to be acknowledged for their accomplishments. To this end the staff should be so organized as to recognize each member for his skill, ability and achievements. With dignity and pride the hospital should provide a roster listing its members and the position each member serves on the staff.

Every one is conscious today of the trend in medicine toward some form of governmental control. Only through staff organization in which we are strong can we hope to maintain ourselves as physicians and surgeons and hospitals on a parity with other medical groups. This need becomes more evident with every new legislative bill in Washington or our respective states. For example in the case of the Emergency Maternal and Infant Care program it well may be remembered that some of our doctors were required not only to be certified as specialists, but also as members of a hospital staff in the capacity of consultant or specialist, before they could collect consultation or surgical fees.

It is evident that our hospitals must maintain good records and that they must set up standards of consultation, of minimal requirements for the surgeon, for other specialists, and for the general practicing physician and surgeon.

I am firmly of the opinion that we should continue to develop and improve staff organization, and that the future welfare and progress of the profession will be in proportion to the achievements of our hospitals—to their development and service rendered. I sincerely believe that the hospital, the patient and the physician and surgeon will gain unlimited advantages through staff organization.

Nothing can expect to exist long without a need for it or without serving a useful purpose. Therefore, staff organization in osteopathic hospitals must serve and accomplish definite purposes. Any institution must build its staff organization on such a firm foundation that the members of the staff, the hospital and the patients will see and know the benefits that are to be gained.

325 W. Jefferson Street

Surgical Aspects of Gallbladder Disease

ROSS B. THOMPSON, D.O.

Richard R. Stuart, Ph.D., Anatomical Discussion and Diagrams
Vernon W. Pierce, D.O., Research
Glendale, Calif.

HISTORY

The first records of study and observations of the biliary passage were made about the year 2000 B.C. by the Babylonians and Assyrians. Examination was made of the biliary passages of sacrificial animals to determine the size of the organs, which was an indication as to whether the gods would be satisfied or not. Herophilus, the father of anatomy, first described the essential difference between the liver of men and that of animals; and it has been noted that the first mention of gallstones in human beings was made by Alexander of Tralles in his "Twelve Medical Books" which were written in the fifth century. The first reported attempt at surgical drainage of the gallbladder was in 1618, by Johann Fabricius. However, it was not until the eighteenth century that Zambecarri and Teckof performed experimental cholecystectomy on animals and thus proved that the presence of the gallbladder is not essential to life or health.

Bobbs is given credit for the first cholecystotomy to remove stones in this country in the year 1867. He was operating upon an abdominal tumor of unknown origin. During the course of the surgery he observed a large cyst which proved to be the gallbladder. He removed the stones from an impacted cystic duct returned the gallbladder to the abdominal cavity. The patient recovered. In 1882, Langenbuch is credited with the first cholecystectomy. The early surgical mortality in the years 1879 to 1885 was really excellent in that fourteen cases in which surgical drainage was instituted Tait reported only one death. From that time forward the development of satisfactory surgical technic and the application of the principles of gallbladder surgery to the cure of disease of the biliary tract developed rapidly. Among the pioneers in this work were Mayo-Robson and Moynihan in England, Kehr in Germany and the Mayo brothers in the United States.

ANATOMY

A complete and detailed description of the biliary system seems unnecessary in a paper of this type, for the surgeons who are likely to read it are already familiar with the arrangement. It would appear useful, however, to refer to some of the less easily understood features as well as to some significant points and variations.

The upper surface of the liver coincides with the diaphragm and so extends from the point where the right midclavicular line crosses the fifth rib, dipping to the level of the xiphisternal joint, to reach the left fifth interspace an inch or so medial to the midclavicular line. The right margin extends downward to a variable point an inch or more inferior to the

costal margin from which the inferior margin reaches upward and to the left in a wavy line, crossing the subcostal angle, and meeting the left end of the upper margin. The fundus of the gallbladder is in relation with the abdominal wall in the angle formed by the lateral margin of the right rectus abdominis muscle and the subcostal margin. It is to be pointed out that, normally, the fundus of the gallbladder is located just inferior to the transpyloric plane which, incidentally, passes through the body of the first lumbar vertebra. (The transpyloric plane equally bisects a vertical line from the suprasternal notch to the symphysis pubis.)

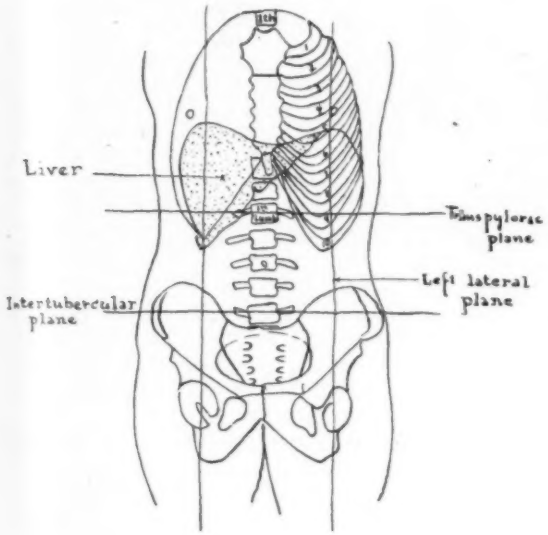

Fig.1. Planes of the Abdomen.

A working knowledge of the biliary system requires a clear picture of the retroperitoneal arrangement in the region of the upper lumbar vertebrae. The inner surface of the posterior abdominal wall is formed laterally by the quadratus lumborum muscles, medially by the lumbar vertebrae, and between these by the psoas major muscles; superiorly the wall is formed by the dorsal part of the diaphragm.

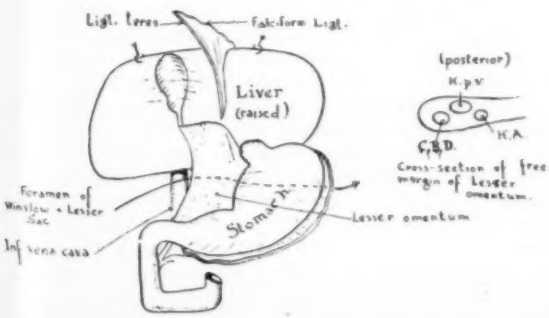

Fig 2 Biliary System. Ventral aspect.

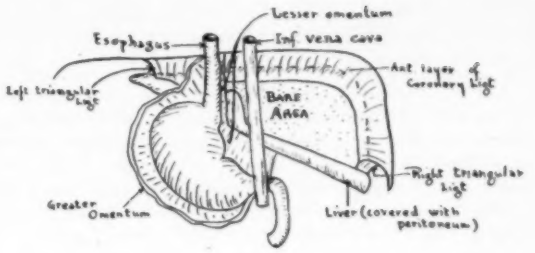

Fig. 3. Liver. Stomach & Adnexa Dorsal aspect.

In the angle between the quadratus lumborum and psoas major muscles from the level of the twelfth thoracic to the third lumbar vertebrae we find the kidneys, the left usually being placed slightly higher than the right.

Ventral to the great vessels (the aorta and inferior vena cava) and occupying a space approximately coincident with the body of the second lumbar vertebra is the pancreas with the neck, body and tail, in that order extending to the left and slightly superiorly across the left kidney to the spleen. The tail of the pancreas lies between the layers of the lienorenal ligament which extends from the left kidney to the spleen.

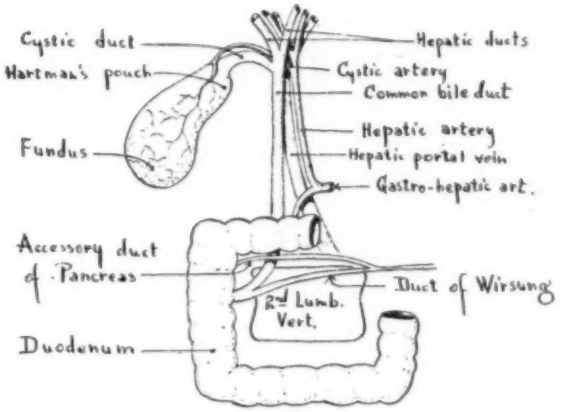

Fig. 4. Biliary Tract. Ventral view.

The duodenum almost completely encircles the body of the pancreas, beginning at a point just to the right of the midplane and ventral to the body of the first lumbar vertebra. From here it extends to the right to the hilum of the kidney, turns inferiorly in relation to the kidney, to the level of the third lumbar vertebra, turns to the left, crossing ventral to the great vessels, and then turns superiorly to the level of the middle of the body of the second lumbar vertebra, where it terminates by joining the jejunum.

At the level of the twelfth thoracic vertebra the aorta gives off the short celiac axis which divides almost at once into left gastric, splenic, and gastro-hepatic (hepatic) arteries. The last named of these passes toward the right, just superior to the duodenum

and behind the peritoneum, dividing finally to produce the gastroduodenal artery (descending) and the hepatic artery (ascending).

The lesser omentum reaches from the duodenum and lesser curvature of the stomach, superiorly to the transverse fissure (porta hepatis) of the liver, ending in a sharp margin somewhat to the right of the midplane of the body, which contains the hepatic pedicle (common bile duct, hepatic portal vein and hepatic artery) and forming the ventral boundary of the epiploic foramen of Winslow.

The gallbladder occupies a fossa on the under surface of the right lobe of the liver, to which it is bound by the visceral peritoneum of the liver. The gallbladder is in communication with the liver bed by blood vessels and, occasionally, small bile ducts. Rarely does the peritoneum come together to form a mesentery.

Between the layers of the lesser omentum, near its free margin, is found the common bile duct, with the hepatic artery to its left and the hepatic portal vein between and behind these two, ascending obliquely from left to right. The common bile duct descends from where it is formed by the junction of the common hepatic duct and cystic duct (a variable point between the liver and the second portion of the duodenum) and descends first between the layers of the lesser omentum then dorsal to behind the first part of the duodenum to open into the medial side of the second portion, usually in common with the main duct of the pancreas. The common hepatic duct is formed in the transverse fissure (porta hepatis) by the junction of the right and left hepatic ducts.

Near its junction with the cystic duct the gallbladder presents a dilatation which is called Hartmann's pouch. The cystic duct contains a spiral valve (of Heister) which may serve to keep the duct patent. The cystic duct courses for a part of its length between the layers of the lesser omentum beside the common hepatic duct to the variable point of junction where the common bile duct begins. Occasionally the gallbladder communicates with one or more of the hepatic ducts by means of accessory cystic ducts.

The hepatic artery courses upward between the layers of the lesser omentum, approaching the bile duct as it goes. At a variable point it divides into right and left branches to the respective lobes of the liver. Either before or after this division, the cystic artery is given off (usually from the right hepatic artery) and passes either in front of or behind the hepatic (or bile) duct and courses along the cystic duct to terminate by dividing into deep and superficial branches to the gallbladder. Occasionally the hepatic artery divides low and the right branch accompanies the cystic duct to its origin before turning superiorly to the liver. In rare instances the right hepatic artery is a branch of the superior mesenteric artery. One case has been observed in our laboratory in which the right hepatic artery accompanied the cystic duct and in its course was joined by a branch from the aorta.

The hepatic portal vein is formed in variable manner dorsal to the pancreas, by the junction of the splenic and superior mesenteric veins and courses upward and to the right, to divide in the porta hepatis, dorsal to the right and left hepatic arteries, into right and left veins to the respective lobes of the liver. In its course, the hepatic portal vein receives the coronary and gastric veins. The cystic veins penetrate directly into the liver bed. Occasionally, one or more cystic veins may open into the portal vein or its branches.

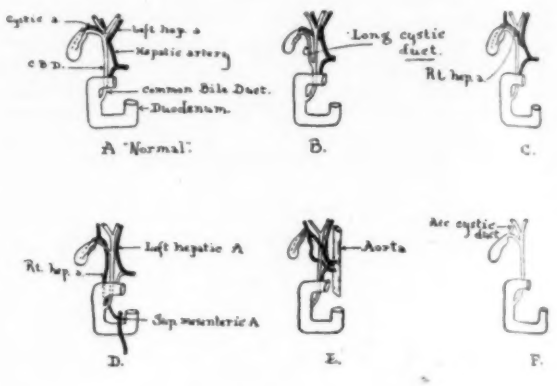

Fig. 5.
Variations in Biliary System.

CAUSES

The gallbladder acts largely as a storehouse for bile which accumulates due both to the resistance of the sphincter of Oddi and to the relaxation of the organ between meals. Bacteria may pass in and out with the flow of bile without causing much harm, but when stagnation takes place and bacteria are present, infection results. This stagnation may be brought about by stones in the ducts, edema from the inflammation, plugs of mucus, pressure from a growth in some neighboring organ or spasm of the sphincter of Oddi. Bacteria may gain entrance to the gallbladder by way of the blood stream or the lymphatics, from the intestinal tract by way of the common duct, or from infection of a contiguous organ. The organisms in the gallbladder may be mixed, the most frequently found being: Staphylococcus, Pneumococcus, Streptococcus and, occasionally, the Bacillus typhosus.

The severity of the infection, the amount of drainage and the degree of stagnation will, of course, determine the extent of involvement. For the purpose of discussion we find it advisable to divide the disease into the different stages of the inflammation: catarrhal, suppurative, phlegmonous and gangrenous or perforative cholecystitis. In the catarrhal type we find edema and congestion with some leukocytic infiltration of the walls of the gallbladder. In the phlegmonous type there is an inflammatory process with hemorrhage, necrosis and softening of the component structures. If the condition is allowed to continue without treatment suppuration may develop, producing an empyema with subsequent enlargement of the gallblader due to its distention with pus. This condition may further develop into the "strawberry gallbladder" (cholesterosis) in which yellowish plaques on the mucosa are characteristic (caused by infiltration of the wall with cholesterol esters).

Cholelithiasis is associated with cholecystitis in about 75 per cent of cases of the definitely diseased organ and is rare before the thirtieth year. The cause is not definitely known, but there are three factors which appear to be important to its development. They

are infection, stagnation and supersaturation of the bile. Desquamated epithelial cells and coagulated exudate furnish an organic matrix for the deposition of the precipitated materials that form the calculus. The chief chemical constituents are cholesterol, bile pigment and calcium salts, which occur in varying proportions in different stones. Cholangitis may be associated with cholecystitis, but it rarely occurs in the absence of obstruction of the common bile duct. When it does occur, there is usually an extension of infection from the bile ducts to the liver with the resulting formation of multiple abscesses. If this occurs the prognosis is greatly altered.

SYMPTOMATOLOGY

Acute catarrhal cholecystitis usually affords a history of previous disturbance of the digestive tract such as flatulence, abdominal distention, and the inability to eat fried or greasy foods without indigestion. The clinical manifestations are sudden onset of pain in the upper right quadrant, headache, sensations of chills, nausea and vomiting, the characteristic icteric sclerae, a leukocyte count of 12,000 to 25,000 or more (depending upon the severity of the infection), with a relatively high per cent of polymorphonuclears, fever, tachycardia, malaise and weakness. The pain may radiate to the back and extend up to the tip of the right scapula and even down the right arm. These symptoms may vary from the acute to those hardly noticeable in the subjective history.

PHYSICAL EXAMINATION

Physical examination in the case of cholecystitis reveals the following pertinent changes: Grossly, the patient may appear slightly jaundiced or may have a clear skin and clear eye, depending on the severity of the symptoms; he may be either ambulatory or bedfast. In either event palpation of the upper right abdominal quadrant is usually poorly tolerated. In the acute case the patient admits severe pain when pressure is placed over the gallbladder area. In mild cholecystitis only a vague sense of discomfort is elicited by such pressure. Without jaundice, the kidney should be carefully delineated and ruled out as a basis for the presenting pain, although the subjective history is of value in this respect. Upon occasion a highly distended gallbladder is palpable through a fairly thin abdominal wall. Personally I have never been able to palpate the gallbladder through the obese wall frequently seen in gallbladder disease. There is tenderness in the region of the eighth thoracic segment on the right side. It may extend higher and lower to include the seventh to the tenth thoracic segments. Referred pain may be present, and occasionally coronary deficiencies produce symptoms so closely associated with those usually ascribed to gallbladder disease that careful differential diagnosis is essential. The blood count, icteric index and finding of bile in the urine are of importance in the final diagnosis of the condition. However, should any of the laboratory evidence fail to verify the physical findings after careful re-evaluation, I should place the emphasis upon the physical findings rather than upon the laboratory work.

Should the symptoms just listed be severe and the pathological changes definite with a high leukocytosis, there is in all probability a stone present in the outlet of the cystic duct, and if this is coupled with increased fever, chills, jaundice, paroxysmal and knife-like pain in the upper right abdominal quadrant, the diagnosis of an obstructive condition is definite.

DIAGNOSIS

Diagnosis is based upon the history, symptoms, physical examination and the collaborative information obtained from the laboratory. The type of case determines the amount of laboratory examination which one may do with safety. In case of acute cholecystitis associated with cholelithiasis, one usually makes a urinalysis and a blood count, determines the icterus index and the van den Bergh reaction and has a flat x-ray plate of the gallbladder. The x-ray may show stones if there is calcium in their composition. After the acute attack has subsided, cholecystography may be performed.

DIFFERENTIAL DIAGNOSIS

One must differentiate between acute appendicitis (usually a high retrocecal appendix), peptic ulcer, liver abscess, pancreatitis, renal disease, subphrenic abscess and coronary occlusion. Of these conditions appendicitis will probably be the most difficult to differentiate. It is here that one realizes the advantages of good laboratory procedure. At the same time demonstration of a pathologic gallbladder by cholecystography does not indicate that the symptoms are of cholecystic origin inasmuch as it is known that a pathologic gallbladder may remain silent for years. Moreover, chronic cholecystitis is so common that it will frequently be present along with some other disease which may be of much more importance than the gallbladder and be producing the symptoms. Courvoisier's law is of diagnostic value to the surgeon during the course of a laparotomy performed on a jaundiced patient. If the surgeon observes a large dilated gallbladder, a diagnosis of extrahepatic biliary obstruction (e.g., carcinoma of the head of the pancreas) is made. On the other hand, if a small shrunken gallbladder is observed the presence of primary gallbladder disease, with or without stones, is indicated. In the absence of jaundice, a dilated gallbladder indicates obstruction of the cystic duct and is spoken of as hydrops of the gallbladder.

PROGNOSIS

The more severe types may prove fatal unless surgery is performed. The usual case, however, will subside in a few days with more or less complete recovery, or may develop into chronic cholecystitis.

TREATMENT

Whether surgery should be undertaken immediately or whether it should wait until the acute symptoms have abated has long been a matter of discussion among leading surgeons. Today it is generally agreed that unless there are signs of a spreading infection with danger of gangrene or perforation of the gallbladder, one should be conservative in the type of treatment until the patient has been built up to the point where the surgical risk is satisfactory. The patient should be confined to bed with the head elevated (slightly) and either heat or cold applied to the upper right quadrant. During the first 24 hours 1,000 to 3,000 cc. of normal saline may be administered intravenously. Food should be withheld until the nausea and vomiting have disappeared and when given should be the usual gallbladder diet. Narcosis is indicated in physiological dosage to fit the patient's requirements. Nembutal, gr. 1½, may be all that is necessary.

Wangensteen suction is indicated in cases of abdominal distention. With inability to pass gas, the colon tube is likewise of value. In cases of clinical jaundice and hyperbilirubinemia the van den Bergh's test should be repeated daily. Osteopathic manipulative treatment should be given twice a day.

If conservative treatment fails to produce improvement within a reasonable length of time surgical intervention must be considered. Two types of surgery may be studied: First, cholecystotomy; second, cholecystectomy. If there is reason to suspect failure of the common duct beyond the point of entrance of the cystic duct and the symptoms are not obviously caused by other conditions, cholecystotomy is indicated.

Cholecystotomy may also be the operation of choice if more radical procedure might cost the patient's life, in case of phlegmonous gallbladder, and of course in malignancy which occludes the common duct. Cholecystectomy would be the choice for all other cases inasmuch as cholecystotomy is not the final answer to inflammatory changes in the gallbladder. These patients are usually returned to surgery at a later date for the removal of the gallbladder, and certainly gallbladder drainage is prone to leave as a sequela far more adhesions than the clean-cut removal of the structure.

There are some surgical hazards that should be borne in mind by the general practitioner as well as by the surgeon in the case of gallbladder surgery. Anomalous structures are not uncommon in this region. The cystic artery varies over a rather wide anatomical base and frequently accidental severance of this structure at a point not visualized by the operator produces hemorrhage that can be disconcerting and may even be fatal. The variations of structure in the case of the cystic and common duct are of interest.

It is not impossible for the cystic duct to enter the common duct on the under surface or at various positions not described in the usual anatomies, in which event the amputation of the cystic duct at a point low in its course may cost the contiguity of the common duct. In such an event the surgeon has contributed to a surgical catastrophe. In itself this is not irreparable if the damage is immediately recognized. Of course there are the abnormalities of the duct system where accessory ducts enter the gallbladder at points higher than the cystic duct proper. It is perhaps this type of abnormality which produces bile drainage after careful ligature of the cystic portion of the duct system has been accomplished in the total resection of the gallbladder. The surgeon may be at a loss to understand the emergence of the bile in the supposedly clean-cut case and yet an accessory duct which is unligated can issue relatively large amounts of bile which drain readily to the abdominal surface. Suspicion may logically be placed upon the type of ligation of the cystic duct in such event and the question as to reoperation is of paramount importance.

A detailed study of other abnormalities which often occur in this area is of interest to the practicing surgeon but lack of time and space at this point does not allow for delineation of all the variations seen in the gall duct system. I am, however, impressed by the statement of a prominent anatomist who recently told me that the surgeons he would allow to operate upon his gallbladder were very few indeed. In his experience as professor of anatomy he has seen so many variations of the gallbladder and its ducts that he felt the surgeon who operated in this region should be more than an accomplished anatomist. Blind technic is not enough. Absolute demonstration of every portion of the biliary tract is essential if the surgeon is to avoid errors and it is not always possible in the live patient to visualize the posterior surface of the gallbladder before damage has been done. Therefore the surgical responsibilities in gallbladder disease are as great as in any other type of surgery which can be elected.

DISCUSSION OF SURGICAL TECHNIC

There is no indication at this time to go into any definite technic for surgery of the gallbladder. Each surgeon has elected his own operative procedure and each is proficient in his own technic. There are, however, a few principles which will bear reiteration.

Choice of Anesthetic Agent.—It is imperative in gallbladder surgery that sufficient relaxation be achieved to allow the surgeon as much room as possible in the operative procedure. The spinal anesthetic fulfills this requirement admirably. For various reasons, however, certain men prefer to avoid entering the spinal canal, and for this reason an inhalation or intravenous anesthetic is chosen. I have found that a combination of pentothal sodium with cyclopropane and curare affords ample relaxation and is well controlled by an accomplished anesthetist.

Personally, I do not prefer ether in any form for gallbladder surgery, as the factor of nausea is increased by this type of anesthesia. Local or regional anesthesia is ideal in the aged or debilitated patient and, properly administered, is found to give excellent results with regard to relaxation. In each case the anesthetic risk, as well as the surgical risk, of the gallbladder patient must be evaluated. The anesthetic risk may to a certain extent alter the surgical risk or even the surgical procedure to be elected in the case of operative intervention.

Positioning of Patient on Operating Table.—In itself this seems simple. However, there have been ill effects and poor surgery due only to the fact that improper positioning was done prior to the surgery. The operating table must be comfortably padded and should have some form of elevation platform for the gallbladder area. With the patient on his back this lift must be placed in exactly the position required to lift the thorax away from the abdomen. The padding must be such as to prevent any sharp contact or point along the spinal column, lest necrosis from pressure be caused. The positioning of the arms upon the table is of almost equal importance. Recently I have seen three cases of brachial paralysis due to improper extention of the arms and improper padding of the arm rests. In no case should the arms be elevated to the point laterally where strain is placed in the axillary region and this position maintained over a long period. Pressure in the region of the olecranon is likewise poorly tolerated. The responsibility of placing the patient on the table is not usually relegated to the surgeon. Nevertheless, he should supervise the entire procedure and make sure, before the patient is draped, that no damage can be done by the position in which he is placed upon the table. Proper grounding of the table, the anesthetic machine, the anesthetist and the surgeon must be insured, particularly if inhalation anesthetics are elected. This is especially important in high altitude and dry climate. California now has a state law requiring this grounding by acceptable means before surgery is undertaken.

INCISIONS FOR GALLBLADDER SURGERY

Numerous types of incision are acceptable for surgery of the gallbladder. To name a few of the most commonly used:

In the Longitudinal Plane.—The right paramedian incision, the right mid-rectus incision or Riedel's incision, and the upper right pararectus incision. In Germany, the last mentioned is known as the Langenbach, and in English-speaking countries also as the Lawson-Tait, incision.

In the Transverse Plane.—The bilateral, transrectus, transverse incisions, Sprengel's incision, Courvoisier's incision and Mikulicz-Kausch incision.

There is a growing tendency to favor the transverse incision for gallbladder surgery. The important consideration is only that sufficient space be given the operator to visualize and demonstrate the tissue upon which he is to work. Working in a confined space with failure to visualize the structures is the greatest cause of danger inherent in gallbladder surgery.

POSTOPERATIVE CARE OF THE GALLBLADDER PATIENT

Postoperative care in gallbladder cases varies but little from that of any other upper abdominal surgery. In general it may be said that early ambulation is desirable. It is true also that early feeding is of value. The administration of salt solutions or sugar solutions, and intravenous protein in the form of amino acids to the debilitated patient, are of great value. However, should the patient be classified as a good anesthetic risk and a good operative risk, it is quite possible that the resumption of water and food by mouth within a reasonable time will render unnecessary the use of any intravenous fluid or food. Careful observation, sufficient narcosis to alleviate the pain, careful check of the fluid balance of the body and the early institution of prophylactic care, or even therapeutic care, should ileus be suspected, are important.

The osteopathic corrective technic associated with upper abdominal problems must not be ignored if the patient's best interests are to be served. Nothing gives relief to the individual who has had upper abdominal surgery more than gentle manipulative therapy in the mid-thoracic and upper lumbar spinal regions. This, together with early ambulation, insures minimal discomfort during the immediate postoperative period.

In that period careful direction of the diet and resumption of exercise, together with general hygienic conditions should be discussed with the patient, and his discharge is not to be accomplished until he has resumed his normal functions and all physiological activities.

COMPLICATIONS

The treatment of complications is specific and directed toward the complication encountered. In event of such surgical catastrophe as sectioning the common duct, repair of the structure is demanded.

SUMMARY

1. Gallbladder disease is usually predicated upon a low-grade bacterial infection. It is more common in the female, especially in the multipara. It is no respecter of age.

2. Gallbladder disease usually clears spontaneously with conservative care. In event this fails, surgical intervention is important.

3. A careful study of the anatomy of the biliary tract is essential to the surgical treatment of biliary disease.

4. Cholecystectomy is preferred over cholecystotomy in the majority of gallbladder cases.

5. Choice of anesthetic agent is important in that the type of anesthetic should allow maximal relaxation of the abdominal wall.

6. Prevention of postoperative complications is aided by correct operative positioning.

7. Postoperative care is important in returning the patient to his normal environment as soon as possible.

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305 N. Central Avenue

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A Note About the Surgery Supplement

The nine papers published in this supplement give convincing proof of what cooperative effort can accomplish. What this specialty college has done is not altogether new. Last month's assembly of proctology papers resulted from the same kind of plan. A program chairman called for manuscripts of the addresses given. Those who had places on the program responded. The editorial advisory committee of the college did its part and the papers came to the office of the Association in time. This pattern, in its general outline, can be followed in many places. Divisional society conventions have many addresses which should reach a far wider audience than they do. Even if such a program is not gathered into one symposium, such papers can add much to the value of the JOURNAL.

The purpose of the JOURNAL, so far as its professional articles are concerned, can be accomplished only with the cooperation of organizations, institutions and individual members. Part of this cooperation expresses itself in finding fault with what is wrong; part in offering constructive suggestions; part in providing articles. We are coming up to 1947 with bright prospects for the JOURNAL and the fulfillment of these prospects depends upon the kind of cooperation given, in this instance, by the American College of Osteopathic Surgeons.

CONVENTIONS AND MEETINGS

(Continued from page 256)

Marie E. Baur, Jenkintown; vocational guidance, Blanche C. Allen, Bryn Mawr; ethics and censorship, Herman R. Kramm, Downingtown; insurance, Warren A. Pratt, Upper Darby; veterans, William J. Beirn, Norristown; industrial relations, Nelson H. Jones, Paoli.

Third District

S. J. O'Brien, Reading, spoke on "Precautions Against the Common Cold" at the meeting in Allentown on October 10.

The following officers were elected: President, Robert C. Erwin, Allentown; vice chairman, Sterling L. Harvey, Easton; secretary, George S. Esayian, Quakertown; treasurer, Harold A. Bell, Easton.

Fourth District

At the meeting on October 17 E. J. Thomas, Honesdale, was scheduled to speak on "Poor Posture Causes Colds."

The officers elected were: Chairman, D. Deane Maxwell, Carbondale; vice chairman, John L. McCorkle, Mehoopany; secretary-treasurer, Richard W. Evans, Scranton.

The committee chairmen are: Membership, George W. Howard; vocational guidance, John S. Nichols; insurance, Margaret Evans; public health, Ada Hobbs, all of Scranton; ethics and censorship and hospitals and clinics, Paul F. Wallat, Hawley; district convention, Dr. McCorkle; industrial and institutional service and veterans, E. J. Thomas, Honesdale.

Fifth District

The officers elected at the meeting on October 27 were: Chairman, George C. Wolf, Lancaster; vice chairman, Isadore Siegel, Lititz; secretary-treasurer, William S. Mahon, New Cumberland.

The committee chairmen are: Hospitals and clinics, Wallace R. Gregory, Manheim; program, Henry H. Hillard, Lancaster; membership, William M. Irwin, Sunbury; vocational guidance, Dr. Siegel; ethics and censorship, K. T. Steigelman, York; insurance, Omer C. Cole, Lewistown; veterans, John J. Rich, Harrisburg; industrial relations, Harvey C. Orth, Lewistown; public health education, J. Clarence Bachman, Harrisburg; professional and public health legislation, John McA. Ulrich, Steelton.

Sixth District

"Precautions Against the Common Cold" was the subject presented by S. W. Cook, Towanda, at the meeting in Williamsport on October 2.

The officers elected were: Chairman, Dr. Cook; vice chairman, Dudley Turner, Jr., Williamsport; secretary-treasurer, Harry E. Davis, Lewisburg.

The committee chairmen are: Membership, Dr. Davis; ethics and censorship, Jack E. Smith, Emporium; hospitals and clinics, Lawrence Brown, Troy; district program and vocational guidance, Dr. Turner; public health, Louis A. Lyon, Wellsboro; industrial and institutional service, Elwood Slingerland, Canton; insurance, Robert Louis Arble, State College; veterans, C. Howard Bowman, Williamsport.

Seventh District

The officers elected at the meeting on October 30 are as follows: Chairman, O. O. Wentling, Erie; vice chairman, Lloyd R. Bashaw, Erie; secretary-treasurer, E. B. Buckalew, Girard.

TENNESSEE

State Society

The 1946 convention was held in Memphis October 3, 4. The program was announced in the November JOURNAL.

L. D. Chesemore, Paris, assumed the presidency. The following officers were elected: President-elect, H. Perry Bynum, Memphis; vice presidents, Mary Davis, Memphis, Philip Adams, Tracy City, and Harry Worlock, Elizabethton; secretary-treasurer, Helen Terhuwen, Nashville (re-elected); trustees, Stanley Pettit, Cleveland, M. E. Coy, Jackson, and J. Allen Johnson, Bristol.

TEXAS

Dallas County

R. H. Lorenz, Dallas, read a paper on "Hernia" at the meeting on October 10 in Dallas.

VERMONT

State Society

The officers were announced in the November JOURNAL. The committee chairmen are: Legislation, T. P. Dunleavy, Barre; vocational guidance, H. I. Slocum, Middlebury; veterans, E. K. Merkley, Newport; membership, R. K. Dunn, Brattleboro; radio, H. K. Sherburne, Jr., Rutland; hospitals and clinics, B. W. Ditmore, Bennington; public health and education, F. H. Caffin, Chester; industrial and institutional service, John Prendergast, Poultney; statistics, Eva M. Somerville, St. Johnsbury; professional education and development, Marian Rice, Windsor; divisional societies, E. E. Trask, Bellows Falls; publicity, J. M. MacDonald, Rutland; 1947 program chairman, R. H. Bartlett, Burlington; 1947 convention arrangements, Dr. MacDonald. The members of the Legislative Advisory Committee are: D. S. Atwood, St. Johnsbury; C. D. Beale, Rutland, R. L. Martin, Montpelier, and Dr. Rice.

WASHINGTON

Hospital Association

See Northwest Hospital Association under Oregon.

WEST VIRGINIA

Ohio Valley

At the meeting in Wheeling on September 26 W. C. Rankin, Marietta, Ohio, spoke on "Cranial Technic."

Monongahela Valley

"Cranial Technic" was the topic discussed by W. C. Rankin, Marietta, Ohio, at the meeting in Clarksburg on October 4.

The following officers were elected: President, Robert Coda, Morgantown; vice president, Leroy Sparks; secretary-treasurer, Preston B. Gandy, both of Clarksburg.

A meeting was scheduled to be held in Morgantown on November 14.

WISCONSIN

State Society

Committee chairmen were announced in the November JOURNAL. In addition L. D. Thompson, Green Bay, is chairman of the legislative committee.

A partial program for the Union District Societies Meeting was given in the November JOURNAL. In addition to the symposium on gallbladder diseases, the following were scheduled: "The Herniated Disc Problem," E. C. Murphy, Eau Claire; "Aerosol Penicillin in Respiratory Conditions," J. S. Anderson, River Falls; "X-Ray Diagnosis," R. J. Dennis, Milwaukee; "Laboratory Diagnosis and Pathology," G. E. Miller, Milwaukee; and "Symposium on Appendicitis," to be conducted by H. G. Withrow, Hustisford.

Madison District

"Common and Misunderstood Gynecological Conditions" was scheduled to be presented by Thomas R. Tull, Chicago, at the meeting in Beloit on November 14.

WYOMING

State Society

The officers were announced in the August JOURNAL. The committee chairmen are: Legislation, John A. Niemann, Cheyenne; vocational guidance, Irvin J. King, Riverton; Osteopathic Progress Fund, Clara P. Accola, Buffalo; convention, H. L. Tunnell, Lander.

CANADA

Canadian Osteopathic Association

The annual meeting was held in Montreal October 17-19. The following program was announced in advance: "Osteopathic Posology," "Considerations of Arthritis," "The Osteopathic Management of Gallbladder Disease," and "Pains in the Lower-Back," C. Gorham Beckwith, Hudson, N. Y.; "The Cardiac Patient Past Fifty," and "Osteopathic Pathology and Therapy," S. V. Robuck, Chicago; "Osteopathic Management of Difficult Problems," "Clinical Applications of Osteopathic Research," and "Osteopathic Diagnosis and Prognosis by Palpation," J. S. Denslow, Kirksville, Mo.

W. P. Currie, Montreal, was installed as president and the following officers were elected: President-elect, F. G. Marshall, Montreal; vice president, J. Edwin Wilson, Barrie; secretary-treasurer, Allan A. Eggleston, Montreal (re-elected). The members of the Board of Directors are: B. E. Marshall, Montreal; P. J. Leonard, Fredericton, Doris M. Tanner, Regina, M. P. Thorpe, and J. T. Atkinson, both of Vancouver, D. A. Jaquith, Toronto, J. G. Leslie, Portage La Prairie, J. M. MacLeod, Moncton.

SPECIAL AND SPECIALTY GROUPS

AMERICAN COLLEGE OF OSTEOPATHIC OBSTETRICIANS

The officers were announced in the roster in the September JOURNAL. K. R. M. Thompson, Chicago, is trustee. The committee chairmen are: Committee for Setting Up Minimum Standards for Obstetrical Units of Osteopathic Hospitals, Robert B. Bachman, Kirksville, Mo.; Committee for Obtaining and Presenting Statistics of Osteopathic Obstetrics on an Annual Basis, B. L. Gleason, Larned, Kans.; Committee on Credentials and Membership, John Otis Carr, Larned, Kans.; Editorial Committee, Margaret Jones, Kansas City, Mo.

AMERICAN COLLEGE OF OSTEOPATHIC SURGEONS

The officers and the Board of Governors were announced in the November JOURNAL. The members of the Executive Committee are: Edward T. Abbott, Los Angeles, Frank A. Dilatush, Dayton, Ohio, Orel F. Martin, Coral Gables, Fla., Richard A. Sheppard, Cleveland, H. Willard Sterrett, Philadelphia, and George C. Widney, Albuquerque, N. Mex.

The committee chairmen are: Membership and ethics, John P. Schwartz, Des Moines, Iowa; rules and regulations, Ralph P. Baker, Erie, Pa.; editorial advisory, Arthur M. Flack, Jr., Philadelphia; legislation, L. W. Jamieson, Sioux City, Iowa; hospital inspection, Harry L. Collins, Chicago; graduate and postgraduate education, J. Willoughby Howe, Hollywood, Cal.; clinical research, Howard E. Lamb, Denver; clearing, Vincent P. Carroll, Laguna Beach, Cal.; visual education, Ross B. Thompson, Glendale, Cal.; ceremonial, Dr. Abbott; assembly location, Dr. Martin; resolution, Dr. Dilatush. The general chairman for the Los Angeles meeting is K. Grosvenor Bailey, Los Angeles, and the program chairman is Lucius B. Faires, Los Angeles. A. C. Johnson, Detroit, is chairman of railroad transportation.

AMERICAN OSTEOPATHIC COLLEGE OF PROCTOLOGY

The officers were announced in the roster in the September JOURNAL. Carl S. Stillman, Jr., San Diego, Cal., is chairman of the Bureau of Ethics, Censorship and Publications. The committee chairmen are: Credentials, Marille Sparks, Dallas, Tex.; research, Joseph Cronin, Boston; outline for model case records, A. Clinton McKinstry, Cincinnati.

EASTERN IOWA OSTEOPATHIC CRANIAL STUDY GROUP

A meeting was held in Davenport on September 19.

IOWA OSTEOPATHIC SOCIETY OF AMBULANT SURGERY

The officers are: B. A. Wayland, Cedar Rapids; secretary-treasurer, Tyrus C. Peace, Redfield.

NORTHWEST HOSPITAL ASSOCIATION

See under Oregon.

PACIFIC COAST PROCTOLOGIC SOCIETY

The Pacific Coast Proctologic Society which is a component society of the American Osteopathic Society of Proctology held its annual convention in Los Angeles September 29, 30.

The following are the officers: President, Ezra Lax, Los Angeles; president-elect, Arthur O. Dudley, Pasadena; secretary-treasurer, Francis M. Neff, Long Beach.

PENNSYLVANIA OSTEOPATHIC SURGICAL SOCIETY

The officers who were elected at the September meeting are as follows: President, Walter F. Rossman, Grove City; vice president, J. Ernest Leuzinger, Philadelphia; secretary-treasurer, Michael Blackstone, Allentown; trustees, H. Willard Sterrett and Carlton Street, both of Philadelphia.

PUGET SOUND ACADEMY OF APPLIED OSTEOPATHY

The following program was announced for the meeting scheduled to be held in Seattle October 16: "Studies in Osteopathic Dynamics," E. L. Shepler, Mount Vernon; "Posture As Related to Health," Leanna Terry, Seattle; "Medical Use of Atomic Energy," Mary Alice Hoover, Tacoma; "Technic of Cardiac Diagnosis," A. B. Cunningham, Seattle; "Osteopathic Management of Disorders of the Duodenum," George Fuller, Everett.

ROCKY MOUNTAIN CONFERENCE

The following program was announced for the meeting scheduled to be held in Denver November 2, 3: "Traumatic Neuroses," "Sacroiliac Syndrome," "General Resume of Technic," and "General Resume of Appendicular Technic," Carter H. Downing, San Francisco; "What's New in Obstetrics," "Practical Pediatrics," "Obstetrical Problems," and "Routine Pediatric Care," Dorothy J. Marsh, Los Angeles; "College Progress in the Profession," Mr. Morris Thompson, President, K.C.O.S., Kirksville, Mo.

State and National Boards

ARIZONA

Basic science examinations December 17. Applications must be filed 2 weeks prior to examination. Address Dr. Francis A. Roy, secretary, Basic Science Examining Board, University of Arizona, Tucson.

COLORADO

Examinations January 7-9. Address C. Robert Starks, D.O., president, Board of Medical Examiners, 1459 Ogden St., Denver 3.

CONNECTICUT

Basic science examinations February 8. Address State Board of Healing Arts, 250 Church St., New Haven 10.

HAWAII

Examinations January 8. Address Mabel A. Runyan, D.O., secretary, Board of Osteopathic Examiners, 2333 C Kalakaua Ave., Honolulu 30.

ILLINOIS

Examinations in January. Address the osteopathic examiner, Oliver C. Foreman, D.O., 58 E. Washington St., Chicago.

IOWA

Basic science examinations January 14. Applications may be received until time of examination. Address Ben H. Peterson, secretary, Board of Basic Science Examiners, Cedar Rapids.

KANSAS

Examinations February 6-8 at Jayhawk Hotel, Topeka. Applications should be filed 5 days before first day of meeting. Address Robert A. Steen, D.O., secretary, Board of Osteopathic Examination and Registration, 307 Nat'l Bank Bldg., Emporia.

KENTUCKY

Examinations December 16-18 at the Henry Clay Hotel, Louisville. Address P. E. Blackerby, M.D., secretary, Board of Health, 620 S. Third St., Louisville.

MASSACHUSETTS

Charles Donovan, D.O., Salem, has been appointed to the Board of Registration in Medicine.

MICHIGAN

Basic science examinations January 10-11 at Ann Arbor and Detroit. Applications must be filed prior to January 1. Address Eloise LeBeau, secretary, Basic Science Board, 101 N. Walnut St., Lansing 15.

MINNESOTA

Basic science examinations January 7, 8 at Millard Hall, University of Minnesota. Address Raymond Bieter, M.D., secretary, Board of Examiners in Basic Sciences, 126 Millard Hall, University of Minnesota, Minneapolis 14.

NEBRASKA

Basic science examinations second Tuesday and Wednesday in January. Applications must be filed 15 days before examination. Address John H. Latta, Ph.D., University of Nebraska College of Medicine, Omaha.

NEVADA

Examinations January 14. Address G. A. Johnson, D.O., secretary, Osteopathic Examining Board, 207 Wonder Bldg., Reno.

NEW MEXICO

Basic science examinations February 2. Address Mrs. Marian Rhea, Asst. Secretary of State, Santa Fe.

NORTH DAKOTA

Examinationns January 7. Address M. M. Kemble, D.O., secretary, Board of Osteopathic Examiners, 6-10 Kresge Block, Minot.

OREGON

Examinations January 22-24 at University of Oregon School Library. Reciprocity applications will be considered at Board meeting January 25. Applications must be filed by January 15. Address Lorienne M. Conlee, executive secretary, Board of Medical Examiners, 608 Failing Bldg., Portland.

RHODE ISLAND

Basic science examinations February 12. Applications must be filed by February 1. Address Mr. Thomas B. Casey, Chief, Division of Professional Regulation, State Office Bldg., Providence 2.

SOUTH DAKOTA

Basic science examinations December 6, 7 at Alonzo Ward Hotel, Aberdeen. Applications should be filed by December 1, but will be received until date of examination. Address Gregg M. Evans, Ph.D., secretary, Board of Examiners in the Basic Sciences, Yankton College, Yankton.

L. L. Massa, D.O., Sturgis, has been appointed to the Board of Osteopathic Examiners for a term expiring April 1, 1949. He succeeds G. C. Redfield, Rapid City, who resigned to accept an appointment as osteopathic member of the State Board of Health.

WASHINGTON

Basic science and professional examinations in January. Address Mr. Harry C. Huse, director, State Department of Licenses, Olympia.

WEST VIRGINIA

The Board of Osteopathy has voted to grant reciprocity to osteopathic physicians holding certificates from the National Board of Examiners for Osteopathic Physicians and Surgeons.

WISCONSIN

Examinations January 14-16 at Madison. Address C. A. Dawson, M.D., secretary, Board of Medical Examiners, River Falls.

WYOMING

Examinations February 3, 4. Address G. M. Anderson, M.D., secretary, State Board of Medical Examiners, State Capitol, Cheyenne.

EXAMINATIONS BY NATIONAL BOARD

The National Board of Examiners for Osteopathic Physicians and Surgeons conducts Parts I and II of its examination on the first Thursday and Friday of each May and December at the six approved colleges. Application blanks may be obtained from the Secretary, and the completed application blank, together with a passport photograph and check for the part or parts to be taken, must be in the Secretary's office by the November 15, or April 15, preceding examination. Part III of the examination will be given in specified locations at the discretion of the Board and for the convenience of the applicant.

Examinations in Part I consist of anatomy, physiology, pathology, chemistry and bacteriology. Part II consists of examination in mental diseases, surgery, obstetrics and gynecology, pediatrics, public health, osteopathic theory and practice. Part III is an oral examination.

Address John E. Rogers, D.O., Secretary, 16 Mount Vernon Street, Oshkosh, Wisconsin.

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Extracts

CONTROVERSIAL ISSUES IN TUBERCULOSIS CONTROL*

In the field of tuberculosis control there are many tools and methods about which there is considerable controversy. As in any field where the thinking is healthy and progressive, the variety of opinion is vigorously expressed and firmly held. In consequence, practice differs.

Among the most highly controversial problems, the use and importance of the tuberculin test is of first significance. In the diagnosis of tuberculosis and for mass surveys, the tuberculin dosage is in dispute. A high initial dose is used in some quarters, while a low dosage is employed in others. There is also great difference of opinion concerning the interpretation of the tuberculin reactions. Similarly, the reading of tuberculous activity in the X-ray evidence of lesions has its champions, while opposing groups believe it impossible to read such activity on an X-ray film. These opposing groups also present contrary solutions to the problem of interpreting primary and reinfection tuberculosis from the X-ray film. Many specialists think we cannot perceive from the X-ray film whether a lesion is primary or reinfection. In spite of the extensive researches done in this field, many interpreters still classify cases principally on the evidence of X-ray films. Furthermore, there is some difference of opinion on the proper disposition of cases that have positive gastric lavage. The more advanced school of thought believes that such cases can be released from the sanitorium and that children with positive gastric findings can go to school. There are other issues, such as the value of miniature films, the significance of BCG vaccination, and the immunity that may be given by a positive tuberculin reaction. These and many other differences of opinion need clarification. It is obvious that extensive research should go forward, so that unanimity of opinion may in future reinforce diagnosis.

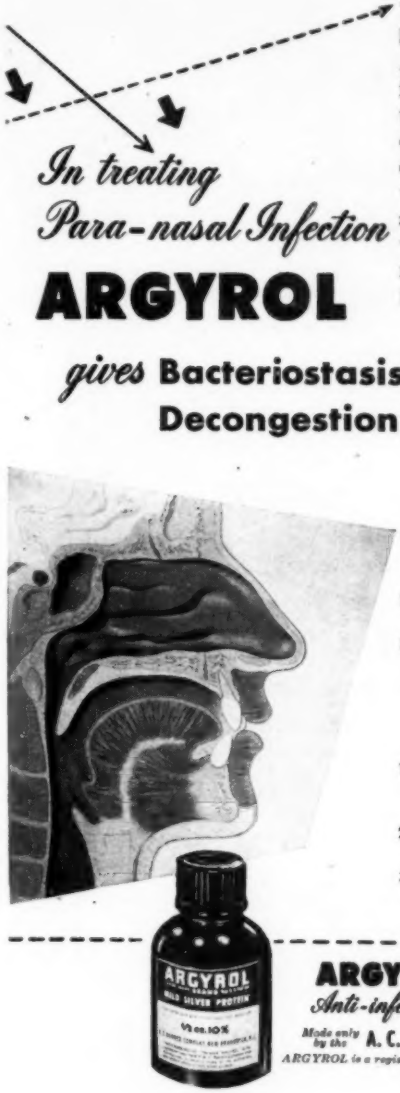
Because it is basic in the control of tuberculosis, the importance of the tuberculin test should have first consideration. It must be clearly understood at the outset that mass radiography has not displaced the tuberculin test. Indeed, it must be stressed that there is greater need than ever for such testing. The tuberculin test is invaluable in detecting reactors to tuberculin among contacts; it permits more accurate differential diagnosis; and it provides sample checks of population groups at yearly intervals in order to arrive at variations in levels of infection. This determinant combined with the findings of mass radiography, which in many instances has resulted in the examination of a majority of the adults in entire communities, will be a precise tool for evaluating the tuberculosis problem in any given area.

Some leading workers in tuberculosis control have utilized the results of tuberculin tests in only two categories—reactors and nonreactors. Others have criticized such usage by pointing out that there is a third group—converters; that is, persons who convert from nonreactor to reactor from one time to another.

Extensive researches among more than 15,000 student nurses in many areas throughout the country have led the Tuberculosis Control Division to conclude that the most critical time for the reactor is the first several years after the change from negative to positive. During these first years the body is fighting infection, and everything should be done to maintin high resistance. The Division is apprehensive of the apparent neglect of this critical period in the life of the converter. It is emphasized that the immediate postconversion period requires close follow-up in order to keep resistance at a high level. Also, it appears to be desirable to minimize exposure until the body has gained control of the infection, and the danger of disease has lessened.

We do not yet know what is the ultimate effect of early massive exposure which does not result in immediately apparent tuberculosis. The later experience of the cohorts of those among whom there was a high mortality rate when young needs extensive study, and the tuberculin test is perhaps our most effective instrument in the discovery of such knowledge. We must institute a long-time life-table study of the converters at various ages. At the same time we must extend the use of tuberculin tests in conjunction with mass radiography, for the purpose of obtaining the infection rate in various age, race, and

*Editoral, *Public Health Reports*, November 1, 1946.



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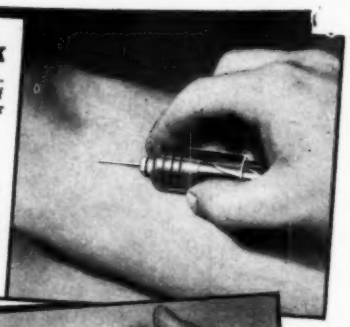

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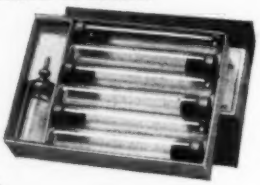

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economic groups in the United States. The tuberculin test properly applied to random groups at regular intervals is a sensitive index to what is being accomplished by all other control methods now in use.

The . . . [following] article, "The Establishment and Use of Fundamental Procedures in Tuberculosis Control," is a forceful description of a point of view that is at variance with the thinking of some other workers in the field. All opinions, however various, merit the most careful study if we are at last to solve the many complex problems of tuberculosis control.

HERMAN E. HILLEBOE,
Medical Director, Chief,
Tuberculosis Control Division.

THE ESTABLISHMENT AND USE OF FUNDAMENTAL PROCEDURES IN TUBERCULOSIS CONTROL

By *J. A. Myers*, Professor of Medicine, Department of Preventive Medicine and Public Health, School of Medicine, University of Minnesota

A chronic disease that may exist in a person for several years or decades is best studied through early detection and subsequent observation in the person affected. Prior to 1920, however, this procedure was seldom followed in the study of tuberculosis in human beings. In that year, an opportunity was afforded to study the disease among university students, where many could be observed over a considerable period of time. For the past 26 years, these observations have been continued. In 1921 the Minneapolis Division of Health arranged for a longitudinal study of tuberculosis among children, from birth through 18 years of age; and later a provision was made by which the studies could be continued among those who had reached adulthood, as well as among other adults.

A serious tuberculosis problem confronted the city of Minneapolis in 1920. The mortality rate was 120 per 100,000 population, and though the morbidity rate was unknown, the health department had many ill persons on record—less than half, probably, of all those who suffered from clinical tuberculosis. Only a small number of sanatorium and hospital beds were available. The majority of persons with infectious disease remained in their homes, and advanced cases in institutions were often permitted to return home so that they could "die happy among friends." A considerable amount of tuberculosis prevailed among animals, particularly cattle, and frequently dairy products were found to be contaminated with living tubercle bacilli of the bovine type. Hence the disease was readily communicated from person to person, and not infrequently, from animal to person.

The incidence of tuberculin reactors had not been determined by 1920 for any large group of persons at a given age level. It was estimated, however, that in the United States, almost 100 percent of the adult population would have reacted if tested. A sharp distinction was made between tuberculosis infection and tuberculosis disease. A person was said to have "infection without disease" if he reacted to tuberculin but showed no symptoms or lesions, and was regarded as having "disease" if he showed lesions or was ill. Those of the former class—more numerous at any given time than those of the latter—were considered to have been immunized; and it was supposed that for the rest of their lives they would walk within a charmed circle of safety. A tuberculin reaction was thought to be an asset. The person who did not react, by young adulthood at least, was believed to be in a hazardous position: if he then became infected, having failed to become immune through a previous infection, he was liable to develop uncontrollable tuberculosis.

Despite this belief, a national movement was under way to increase the number of hospital and sanatorium beds, to pasteurize milk, and to eradicate the disease from cattle. To many, this was tantamount to national suicide; for it was thought that these steps, if carried to extremes, would depriye infants and children of tubercle bacilli, especially of the bovine type, and would necessitate their reaching maturity without immunity—to be vanquished if later infected. This and other paradoxes, by the confusion they created in the minds of physicians, greatly complicated tuberculosis control work.

Tuberculosis in children was considered to be highly fatal. While infection

was generally regarded as an asset, the opinion prevailed that if it occurred within the first 2 years of life, death would follow in 50 to 80 percent of those infected, before immunity could be established. This erroneous view was based on observation of ill infants, the majority of whom had reinfection type of disease, such as pneumonia, meningitis, and miliary tuberculosis. A group of infants with tuberculin reactions but without illness had not been observed to determine whether all infections were highly fatal. Nor had older children been observed to determine the actual evolution of tuberculosis during childhood and adulthood, or the course of the disease in persons first infected as adults.

In 1920, almost all of the present-day diagnostic equipment was available, including the stethoscope, clinical thermometer, microscope, tuberculin test, X-ray, and bronchoscope. Much emphasis was placed upon history of exposure, symptoms, and signs elicited by the conventional chest examination. Tuberculin tests and chest X-ray inspections were seldom made. All equipment was employed routinely, with a view to the proper evaluation of the various diagnostic procedures, methods of dealing with cases, and preventive measures, and especially to the study of the evolutionary process of tuberculosis in the human body.

In little more than a quarter of a century, radical changes have been made in the approach to the total problem of tuberculosis control. The following results have been achieved.

THE TUBERCULIN TEST

Prior to 1921, the tuberculin test was not given extensively, as all adults and most older children were thought to be infected with tubercle bacilli. It was used merely as a confirmatory procedure when examinations revealed, for example, rales and X-ray shadows. In the work among children begun in 1921 in Minneapolis, however, the test was administered routinely; and since 1928, it has been used in examining all students entering the University of Minnesota. The epidermal (Pirquet) method of administration was employed until 1929, when the intracutaneous (Mantoux) method was adopted. Other methods were given adequate comparative trials, but each was discarded in favor of the intracutaneous.

Old tuberculin, procured from the Saranac Lake Laboratory, has been used for the most part, but comparative tests with purified protein derivative (PPD) have been made occasionally on sizable groups. No significant difference has been indicated by the results obtained with the two substances. In using the former, the initial dose has been 0.1 mg., and 1.0 mg. has been given if no reaction to this occurred. In using PPD, first and second injections of 0.00002 mg. and 0.005 mg., respectively, have been given. At first, readings were made 48 hours after administration, but the interval was later increased to 72 hours, in view of the finding that, as a rule, erythema due to trauma will have disappeared in that time, whereas a characteristic tuberculin reaction always lasts 72 hours, and usually much longer.

A true tuberculin reaction presents definite characteristics, consisting of an area of edema, induration, or both, with a diameter of 5 mm. or more at the site of administration. This may or may not be surrounded by hyperemia. In the absence of induration or edema, hyperemia does not constitute a tuberculin reaction and should therefore be ignored. In the majority of instances, however, there is either a total absence of response to the test or an unmistakable reaction. (Hence, we no longer speak of negative and positive reactors, but rather of nonreactors and reactors.) Edema or induration of slightly less than 5 mm. in diameter, which is seen occasionally, should be read as a questionable reaction, and the test should be repeated in one or two months. Such a reaction may represent only residual trauma, or may be due to a low degree of allergy. The latter possibility may be explained as follows: Infection may have occurred so recently that only a low degree of allergy has been established, or the allergy may have so diminished that a milligram of tuberculin cannot elicit a characteristic reaction, which may be the case if tuberculous lesions of the primary or reinfection type have existed for several years without the occurrence of exogenous or endogenous reinfections. If, in a given instance, the former explanation is correct, the repetition of the test in a month or so will elicit a char-

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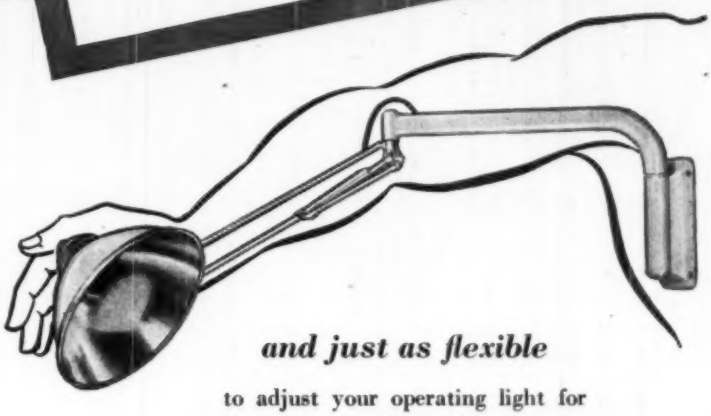

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acteristic reaction. If the second test is not decisive, the latter explanation is indicated, and the dose should be doubled. And if a question still remains, it is entirely safe to administer 5 mg. of tuberculin. These larger doses are unnecessary, however, unless a lesion of undetermined etiology has been located. In most children and young adults with primary tuberculosis, there has not been time as a rule for the allergy to wane significantly; and therefore a single dose of 0.1 mg. of old tuberculin, or a corresponding dose of PPD, is usually adequate.

It may be stated that there are three main sources of error in administering and reading the tuberculin test: (1) Material is not tested to assure adequate potency; (2) the needle is inserted too deeply, so that the tuberculin is deposited subcutaneously; (3) the characteristics of edema or induration, or both, are not present, and erythema or minute nodulation at the site of injection is considered a reaction. This can usually be avoided by reading at 72 hours.

Regardless of the age of the person tested, a characteristic tuberculin reaction indicates the presence of primary tuberculous lesions produced by either the bovine or human type of tubercle bacillus. Since tuberculin is not, as was formerly believed, specific for infection caused by the type of tubercle bacillus from which it is prepared, it is satisfactory for testing whether made from organisms of the bovine or human type. As a result of the efforts of the veterinarians and their allies, it has been uncommon, in recent years, for a person in the United States to become infected with tubercle bacilli of the bovine type; and therefore, among the young children of this country, organisms of the human type are responsible for nearly all of the existing primary lesions. Among adults, however, primary lesions produced by the bovine type probably remain. This is an important consideration in the epidemiology of tuberculosis.

Although the tuberculin test admits of an absolute diagnosis of primary tuberculosis, it is of no value in locating the lesions, in differentiating primary from reinfection type of disease, in determining the extent of lesions, or in detecting the presence of clinical activity. A relatively recent infection or reinfection is apparently indicated by a high degree of allergy. There is some evidence to the effect that in persons with primary tuberculosis, a warning allergy may from time to time be augmented by exogenous or endogenous reinfections. If allergy persists at a high level, it may indicate that the person is in association with a contagious case of tuberculosis, or is being occasionally reinfected endogenously.

The presence of primary tuberculosis cannot be determined by the tuberculin test, or by any other procedure of the examination, during the first 3 to 7 weeks of the development. This period is required for allergy to tuberculoprotein to develop to such a degree as to cause a reaction. At the opposite extreme of the evolution of tuberculosis —when the disease is rapidly progressive or is approaching a fatal termination— allergy may so decrease that it cannot be detected by the usual test. In such cases, however, it is extremely rare for allergy to disappear completely, and it can usually be detected by administration of sufficiently large doses of tuberculin.

Twenty-five years ago, the tuberculin test was believed to be only applicable to children; but experience has taught that it is of great value in testing persons of any age. In the Minneapolis area, more than 90 percent of the young adults, and even more elderly persons do not have primary tuberculosis, and are therefore nonreactors to tuberculin.

It has been found that as an epidemiological agent, the test excels every other procedure of examination. The tuberculin reactor has received tubercle bacilli from some person or animal, and often the contact has been directly with a person emitting tubercle bacilli. On numerous occasions, only the tuberculin reaction of a child or adult has revealed unsuspected infectious cases among his associates.

Every person who reacts characteristically to tuberculin has tuberculous lesions, regardless of his state of health and the lack of other evidence. Such a person has tuberculosis just as certainly as the patient who is dying from the disease. The difference is one of degree. In the person who is dying, the disease has evolved through various stages; but at one time that person could have been

found to have no evidence of tuberculosis except the tuberculin reaction.

The test excels, further, in determining the effectiveness of a tuberculosis control program. In 1926, for example, children in grade schools selected throughout the city of Minneapolis were tested with tuberculin and 47.3 percent reacted. Tuberculosis control measures were increased by adding sanatorium beds, by eliminating infected cattle from herds, by more extensive educational work, etc. The effectiveness of the additional measures could only be determined by the tuberculin test. In 1936 the test was given in the same schools; 18.9 percent reacted, and control measures were again intensified. Testing in these schools in 1944 revealed that only 7.7 percent of those tested were reactors.

Among the children 6 years of age tested in 1926, the percentage of reactors was 20.8, representing an infection attack rate of 3.46 per year. In 1936 the percentage of 6-year-olds who reacted was 13.5, and in 1944 only 2.1 percent reacted—an attack rate of approximately one-third of 1 percent per annum. Hence, of 300 uninfected children aged 6 or under in 1926, about 10 were infected by 1927; whereas only 1 of 300 uninfected in 1944 were infected by 1945.

Among the 6,668 grade-school children tested in 1944, only 512 reacted; and of these, all but 17 who declined for such reasons as refusal of parents, were given X-ray inspection. Of the 495 inspected, only 68 presented X-ray evidence of calcium deposits, and 4, evidence of pleural adhesions. Had X-ray inspection alone been used and the assumption made that the 72 were tuberculous, only 14.5 percent of 495 with tuberculosis to some degree would have been recorded as having the disease, and the other 423 would have been overlooked. The total picture of conditions thus would have presented a fallacious aspect. Had morbidity and mortality rates been used exclusively as evidence, an even greater sense of false security would have been occasioned.

Jordan, using the same control methods, achieved the ultimate among school children in Minnesota. In 1930, 14.3 percent of the children in an appreciable number of schools reacted to tuberculin. In 1944, no child in these schools was a reactor. It could be said, in passing, that only the tuberculin test could have informed him that this goal had been attained.

The tuberculin test has been our best educational agent. It has given more usable information to more people than any other implement of tuberculosis work. When one has a characteristic reaction and perceives that others have no reaction, he apprehends that he differs from them—that he has something which they do not have. His curiosity is aroused; he immediately experiences a personal interest and manifests a desire for information. If the facts concerning the significance of the reaction are properly presented—if tangible evidence, in other words, is proffered—he is likely to act upon recommendations made for his welfare. One who does not react, on the other hand, can appreciate that he has escaped something that has overtaken the other. He is desirous of information regarding the prevention of tuberculous infection.

THE X-RAY

In the tuberculosis control work in Minneapolis, X-ray film inspection of the chest was only resorted to in 1920 when symptoms or physical signs were present. This procedure was continued among the university students until 1929. When the work among children was begun in 1921, however, routine stereoscopic X-ray films of the chests of all children were requested, regardless of the presence or absence of symptoms, physical signs, or tuberculin sensitivity. X-ray observations in 1921 revealed findings that were almost unbelievable. Shadows, varying from those barely visible to those representing extensive disease in both lungs, appeared on the films of children and young adults who had seemed to be in excellent health. And even after this evidence was made available, abnormal signs could often not be elicited by the conventional examination. During the next few years, such observations were so frequent that it was concluded that examination of the chest was of little value without supplementary X-ray films. Efforts were made immediately to publicize, through journals, talks, and exhibits, the importance of this procedure in every chest examination.

During the first decade of the Minneapolis work, however, the excessive cost of X-ray inspection was recognized as

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an absolute deterrent to its use. Then in 1931 a photographic emulsion was placed on paper, forming a substitute for the cellulose film. Through use of the paper film, rapid exposing, developing, and reading was possible. In a single working day, more than a thousand exposures could be made with one machine, greatly reducing the cost of the finished product. A year later the work that had been done by this method was thoroughly investigated, and comparative studies, using persons in the Minneapolis survey, were made of the new paper and the cellulose film. All significant shadows on the cellulose films were as clearly seen on the paper ones. Because of its economy and potentialities, the paper film was immediately adopted and highly recommended.

The new method was soon applied to the production of photofluorograms—the 35-mm., the 4 x 10-inch, and finally, the 70-mm. size. All of these techniques have proved to be equally satisfactory in detecting and determining the extent of pulmonary lesions. The X-ray problem that seemed insurmountable in the twenties has been reasonably well solved.

During the first 10 years of the Minneapolis study, many physicians believed that most children were infected with tubercle bacilli, and that evidence of the primary lesions should be visible on X-ray films of the chest. There was a tendency, therefore, among those who described films, without knowing the results of corresponding tuberculin tests, to report a disproportionate amount of calcification in the parenchyma, root region, or both. This resulted in a tremendous difference between the number reacting to tuberculin and the number reported to have X-ray evidence of calcium deposits. If all shadows so reported, and all tuberculin reactions, had indicated primary tuberculosis, the discrepancy would not have occurred.

It may be offered, by way of illustration, that of 1,412 cases described in 1925, 1,024 were said to present evidence of calcium deposits. Of these, only 45 percent reacted to tuberculin. Again in 1927, 2,816 cases out of 4,500 were said to present evidence of calcification; but only 1,569 of these with "calcium deposits" were tuberculin reactors. Two questions were asked: (1) Why do so many tuberculin reactors present no evidence of calcification? and (2) Why is so much evidence of calcification reported among nonreactors to tuberculin? Concerning the first, the following was offered:

> The foci may be so small as to cast no shadow on the X-ray film, or they may be in some part of the chest not readily accessible to X-ray inspection.

Concerning the second:

> There is the possibility that the interpretation is not correct in all of the cases. The calcification may be due to other causes than tuberculosis, and a tuberculous lesion resulting in calcification may become completely healed and sterilized so as to give no evidence of infection by the tuberculin test.

In 1927, McPhedran showed that round shadows may be cast by vascular trunks so directed towards the target that the primary ray is approximately axial, and that semi-oval shadows are often recorded when the plane of the curve of vascular trunks is directed

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slightly above or below the axis of the ray. Obviously, many persons reading X-ray films had been interpreting these vascular shadows as deposits of calcium. The error, it seemed, had occurred frequently in reports of the Minneapolis work, and in 1930 all of the previous films were reinterpreted.

In 1941, 5,968 children who had been nonreactors to tuberculin throughout the observation period were reported, as well as 4,377 who had been reactors. There was X-ray evidence of calcification in 1.2 percent of the former and in 27.6 percent of the latter. Neither coccidioidomycosis nor histoplasmosis is endemic in Minneapolis (though some persons from endemic areas immigrate), and apparently no other fungus infection results in a significant number of calcium deposits. There are other causes of pulmonary calcification, however, such as foreign bodies, which probably account for the majority of calcium deposits among the Minneapolis nonreactors and for a small percentage among the reactors.

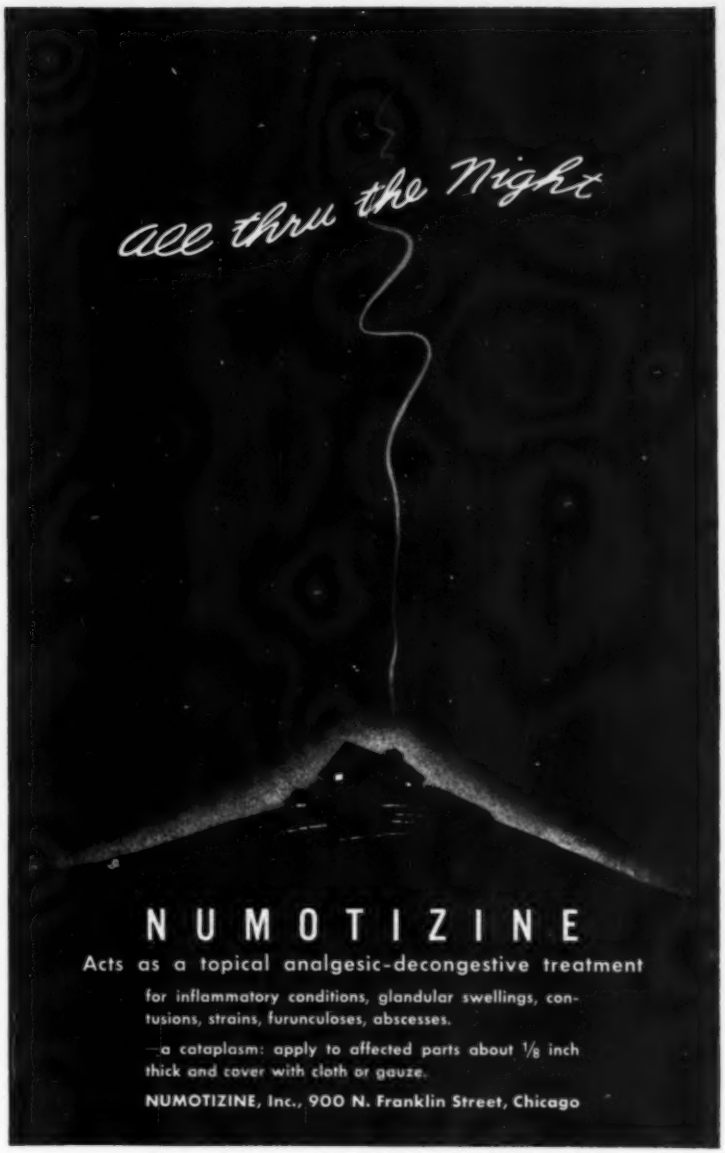
The tuberculin reaction practically coincides with the results of careful postmortem examinations both in human beings and animals. Primary lesions can be found, that is, in the body of nearly every tuberculin reactor, irrespective of the cause of death, if sufficient time and care are given to the examination. The wide discrepancy between tuberculin reactions and X-ray evidence of the presence of primary lesions in the living body has been explained by pathologists. Sweany offers the following:

(1) Many of the primary lesions of tuberculin reactors never attain such size or density as to cast visible shadows. Eight to twelve weeks after primary lesions are established, there is rarely X-ray evidence in more than 5 to 10 percent of the cases in which they exist. From 1 to 5 years later, however, enough calcium has been deposited in some of the lesions to cast shadows that appear on the films; but even this rarely occurs in more than 25 percent of the cases, and usually in much less.

(2) In approximately 25 percent of the lungs, primary lesions develop that are obscured by shadows of other structures, such as the heart or diaphragm.

(3) In an appreciable number of persons with primary tuberculosis (10 to 12 percent), the lesions have extrathoracic locations.

One would expect little correlation, therefore, between tuberculin reactions and X-ray evidence of the presence of primary lesions.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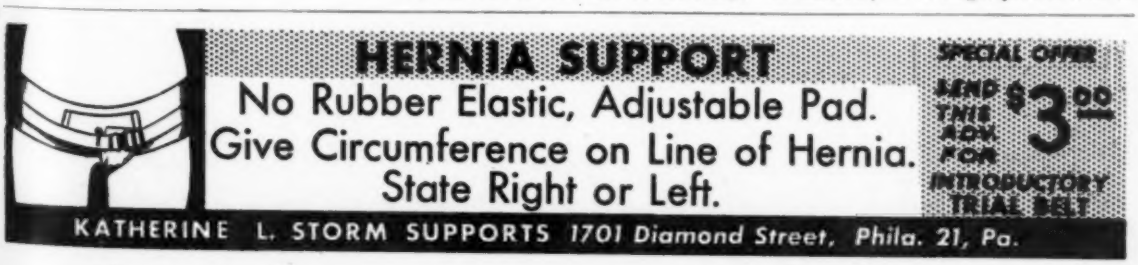
Among the Minneapolis children who reacted to tuberculin from 1921 to 1931, X-ray film inspection of the chest so rarely revealed evidence of significant disease in those under 12 to 14 years of age that its use upon young children was discontinued. To date, no reason for changing this procedure has been found.

During the first 10 years of the study, no significant disease could be detected on one film of the stereoscopic pair that was not equally discernible on the other. Stereoscopic film production was therefore discontinued, and single-film inspection has since been used.

The 10-year data also revealed that no phase of the examination had resulted in discovery of a single proved case of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either primary or reinfection type of tuberculosis among nonreactors to tuberculin. From 1921 to 1941, 5,968 children who were nonreactors to tuberculin throughout the period were observed. In 95.6 percent, no evidence of disease of any kind was detected by X-ray film inspection of the chest, and in the remaining 4.4 percent, there was only evidence of pleural changes, calcium deposits, and nontuberculous pulmonary disease. Among 4,377 reactors, on the other hand, only 58.1 percent had films that were entirely clear. The remaining 41.9 percent gave evidence of such pathologic conditions as pleural changes, primary lesions in the pneumonic or atelectatic stage, calcification, nontuberculous pulmonary disease, and pulmonary tuberculosis of the reinfection type. The unimportance of making chest X-ray films of nonreactors to tuberculin in searching for tuberculosis of any form, and the great importance of periodically making such films for all adult reactors, were further manifested by these observations. Chest X-ray inspection of nonreactors was discontinued.

The Minneapolis work has indicated that an extremely valuable use of the X-ray is in the periodic inspection of the chests of adult reactors to tuberculin—those who react upon first examination as well as those who become reactors later. Between 1921 and 1926, for example, 1,033 children who were reactors upon first examination were again observed. Fifteen, at the average age of 14 years, showed evidence of already having the reinfection type of pulmonary tuberculosis. Nine of these died at the average age of 20; in 1941 the 6 survivors were 26 years old. By that time, 41 others had developed pulmonary tuberculosis of the reinfection type. Two of these had died of tuberculous pneumonia in infancy, and the remaining 39 had shown evidence of chronic reinfection at the average age of 19. Of these, 14 died at the average age of 22; and the remaining 25, at an average age of 26, were still living in 1941. Of the 1,033 children first mentioned, there were 18 who, at first examination or later, gave evidence of the reinfection type of extrathoracic tuberculosis.

From 1921 to 1926, 216 children became tuberculin reactors. By 1941, 13 had developed pulmonary tuberculosis of the reinfection type, detected at the average age of 20 years. It was observed, throughout the period, that after the chronic reinfection type of pulmonary tuberculosis was first detected by X-ray shadow, 2 or 3 years usually elapsed before it evolved to such proportions that symptoms appeared, stethoscopic findings were present, or tubercle bacilli were found in the sputum. This again emphasized the great importance of periodic X-ray inspection of the chests of all adult tuberculin reactors. Beyond a doubt, the high mortality among the earlier cases was due, in part, to insufficient X-ray inspection of their chests, and it was accordingly recommended that the interval between X-ray inspections never exceed 1 year.

In the Minneapolis work, a considerable number of adult tuberculin reactors have recently been seen who at first present clear X-ray films of the chest, but within a year show evidence of moderately or far advanced disease. When inspection was made for reasons such as symptoms, surveys, etc., extensive disease was found in some cases within 3 to 6 months after clear chest films were observed. Apparently this occurs in a minority of tuberculin reactors who develop the chronic reinfection type of pulmonary tuberculosis as a result of bronchogenic spread from lesions of the previously existing primary complexes. It now appears, however, to be a sufficiently large minority to suggest strongly that annual X-ray inspections of the chests of adult reactors are inadequate, and that inspections should be made at least every 6 months. In the Minneapolis area, the number of adults who react to tuberculin has become so small that such inspection is a physical possibility.

At the beginning of the Minneapolis work, it was held that all who were to develop clinical tuberculosis would do so in early life. Observation has shown, however, that demonstrable clinical lesions develop in tuberculin reactors of any age. The futility of setting an age limit, such as 25 years, for discontinuing periodic X-ray inspection of the chest is therefore obvious. These inspections should be continued, regardless of age, as long as the person reacts to tuberculin.

Although the great value of X-ray inspection of the chest was early recognized, enthusiasm for this phase of the examination was never allowed to outrun judgment. It was obvious that the X-ray had serious limitations, and that it was just as important to establish facts concerning them as concerning its advantages. Data on all phases of the examination, accumulated for 10 years, were analyzed. The results showed that a good many persons who had been diagnosed as tuberculous because of chest X-ray shadows did not have pulmonary tuberculosis, but had, instead, other pulmonary pathologic conditions that produced shadows indistinguishable from those cast by tuberculous lesions. The number of such cases was so large that the observers were convinced that X-ray shadows were never pathognomonic.

It was strongly recommended, therefore, that no one—roentgenologist, pediatrist, internist, surgeon, or chest specialist—attempt to diagnose any pulmonary pathologic condition by X-ray. It was further recommended that those reading films limit themselves to describing shadows with reference to location, extent, etc., and then list the conditions that might have resulted in the shadows. And it was pointed out that actual diagnosis could only be made by other phases of the examination—that it was enough for the X-ray to supersede other investigative procedures in locating areas of disease. To attempt to carry the X-ray beyond this point is to enter the field of speculation in diagnosis. Moreover, to attempt to determine the activity of proved tuberculous lesions by a single X-ray shadow is preposterous. In the years following the demonstration, no evidence has been adduced to change this opinion.

DETERMINING ACCURATE DIAGNOSES

In 1921, symptoms such as marked loss of weight, anemia, and fever played an important role in the diagnosis of tuberculosis among children. X-ray shadows and physical signs, such as rales and those thought to indicate the presence of large lymph nodes at the roots of the lungs, particularly d'Espine's sign, were given much consideration. Little attention was paid to evidence elicited by the tuberculin test, and diagnoses were often based upon rales or X-ray shadows in nonreactors. Long observation revealed that such diagnoses were never correct. Lesions thought to be tuberculous proved to be the result of conditions such as bronchiectasis, abscess, and unresolved pneumonia.

In Minneapolis the tuberculin test was administered routinely from the first, and all were given stereoscopic X-ray inspection of the chest, regardless of the tuberculin reaction. In addition, a number of special procedures were included. Data were assembled that later proved of extreme value in determining the efficacy of the various diagnostic methods.

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*Griesman, B. L.: Arch. Otolaryngology 39:124, 1944; also: J.A.M.A. 125:173, 1944; Yearbook of Eye, Ear, Nose & Throat, 1944, p. 309. Also Novak, F. J., Jr.: Arch. Otolaryngology 38:241, 1943.
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Although a characteristic tuberculin reaction is sufficient to justify a definite diagnosis of the primary type of tuberculosis, it gives no information as to the presence or absence of the reinfection type. But since this type develops only in persons who are sensitized to tuberculo-protein, it is obvious that any lesion demonstrated in the body of a tuberculin reactor may represent this type of disease. That a person reacts to tuberculin is not proof, of course, that a given lesion is tuberculous: nontuberculous pulmonary lesions are as likely to develop in the bodies of reactors as in those of nonreactors. Hence, the tuberculin test serves only to identify persons with primary tuberculosis who may, at the time of testing, have the reinfection type of disease, or may subsequently develop it. This, in itself, is a definite requisition for other procedures in examination.

X-ray inspection of the chest constitutes but one of these procedures. When lesions are sufficiently large and dense to be regarded as evidence of gross pathologic processes, they absorb X-rays so as to cast shadows on sensitized film. But the shadows, it should be emphasized, are not pathognomonic: one cannot determine whether they represent tuberculous or nontuberculous lesions. Hence, the X-ray denotes those persons with gross pulmonary disease, but does not determine its etiology. By chest X-ray shadows alone, it is impossible to differentiate new primary lesions from those of the reinfection type. Only when the duration of the sensitivity to tuberculo-

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protein is known is such a differentiation immediately possible.

Calcification revealed by chest X-ray films of nonreactors to tuberculin is almost never due to tuberculosis except in an undetermined percentage where all tubercle bacilli in the body have died and the allergy has disappeared. The recent work of Aronson, Palmer, and Christie has revealed that in certain parts of the country, the long-suspected fungi are responsible for far more of the calcium deposits in human bodies than is the tubercle bacillus. This is true in the areas where coccidioidomycosis and histoplasmosis are endemic. Tests specific for tuberculosis, coccidioidomycosis, histoplasmosis, etc., are therefore essential in diagnosis. It is also true that not all calcareous deposits in tuberculin reactors are due to tuberculosis. The deposition of calcium is not a specific process, and therefore evidence of calcification found in chest X-ray inspection never justifies a diagnosis of any disease.

When a lesion is found in a tuberculin reactor through the shadow it casts, its etiology must still be determined. Symptoms and signs elicited by the conventional physical examination are not pathognomonic; when due to pulmonary tuberculosis, they are usually not in evidence until the disease has reached an advanced stage; and therefore symptoms and conventional physical signs are of little value in differential diagnosis.

Like the tuberculin reaction, the recovery of tubercle bacilli is specific for tuberculosis. This is not true of evidence obtained by any other procedure in the examination. When a tuberculin reaction denotes the presence of tubercle bacilli, our immediate concern is whether they are being liberated from the suspected lesion, constituting a hazard to the infected person and his associates. In the Minneapolis work, gastric lavage has been employed with considerable success upon failure to find acid-fast bacilli in the sputum, or in the absence of sputum. Pulmonary lavage, however, though said to be harmless, has not been used. The examinee's body is inspected for draining sinuses, and if found, the discharges are searched for acid-fast bacilli. Examinations of feces for bacilli have occasionally been made.

In the early years of the Minneapolis work, the recovery of acid-fast bacilli was regarded as prima facie evidence of tuberculosis. Errors in diagnosis resulted, however, for the following reasons:

(1) Some acid-fast bacilli are nonpathogenic saprophytes.

(2) Containers, though sterilized, may retain dead tubercle bacilli from previous specimens if the proper methods are not used to insure their disintegration.

(3) Laboratory mistakes occur, such as mislabeling and confusing of specimens, as well as improper identification. Hence, in questionable cases, only a presumptive diagnosis is made when acid-fast bacilli are found, and the final judgment awaits the evidence of culture, or better, of animal inoculation.

Failure to discover tubercle bacilli in any suspected case does not prove their absence. Perseverance may result in their disclosure weeks or even months after the search is begun.

Serial X-ray film inspections of lesions are helpful when tubercle bacilli cannot be recovered. Lesions that produce shadows thought to represent tuberculosis often prove to be due to acute infections, which may disappear promptly; and in such cases, films made 1 month later are usually clear. Infections of this kind were apparently responsible for 10 to 15 percent of the rejections for military service in World War II.

The Minneapolis observations have revealed that many lesions found by X-ray among adults have neither receded nor progressed, as far as can be determined by shadows, throughout the observation period. This finding, in the absence of other evidence, strongly suggests stability; and if a diagnosis of tuberculosis is justified (such lesions are often nontuberculous), the disease may be classified as arrested or apparently cured. Again, shadows on serial films may show evidence of decrease or increase in size, as well as of persistence, thus indicating instability. When such shadows are due to tuberculous lesions, there may be a total absence of symptoms; but if they are due to such conditions as unresolved pneumonia, abscess, etc., the final diagnosis is assisted by evidence of toxemia, blood findings, etc.

Among adults, particularly those over 35 years of age, there is enough likelihood that a recently discovered pulmonary lesion is malignant to suggest

that waiting for a long series of films would be dangerous. If the shadow does not disappear promptly, the bronchoscopist should always be consulted. "X-ray diagnosis" in the early years sometimes resulted in failure to diagnose malignancy until it was widespread. Bronchoscopy, skillfully performed, does no harm, and in many cases results in accurate diagnosis, which are impossible in its absence.

As diagnostic evidence, the red blood cell sedimentation rate has not been especially efficacious among the Minneapolis examinees. It has often been found to be within normal limits in persons with recent, sizeable primary and reinfection type of tuberculous infiltrations. When the rate is accelerated, one may question its importance, inasmuch as it is not pathognomonic. It has been found of considerable value, however, in observing the course of disease in well-established cases when other conditions have, as far as possible, been ruled out. As differential leucocyte counts are not pathognomonic, they have not been taken routinely in the Minneapolis work.

The futility of making a diagnosis of tuberculosis in the absence of a tuberculin reaction or a recovery of tubercle bacilli has been emphasized. This practice has always led to incorrect diagnoses. The only results of the examination that give specific information are demonstrations of a sensitivity to tuberculin and of the presence of tubercle bacilli. Evidence obtained through all other procedures permits only speculation.

SURVEYS

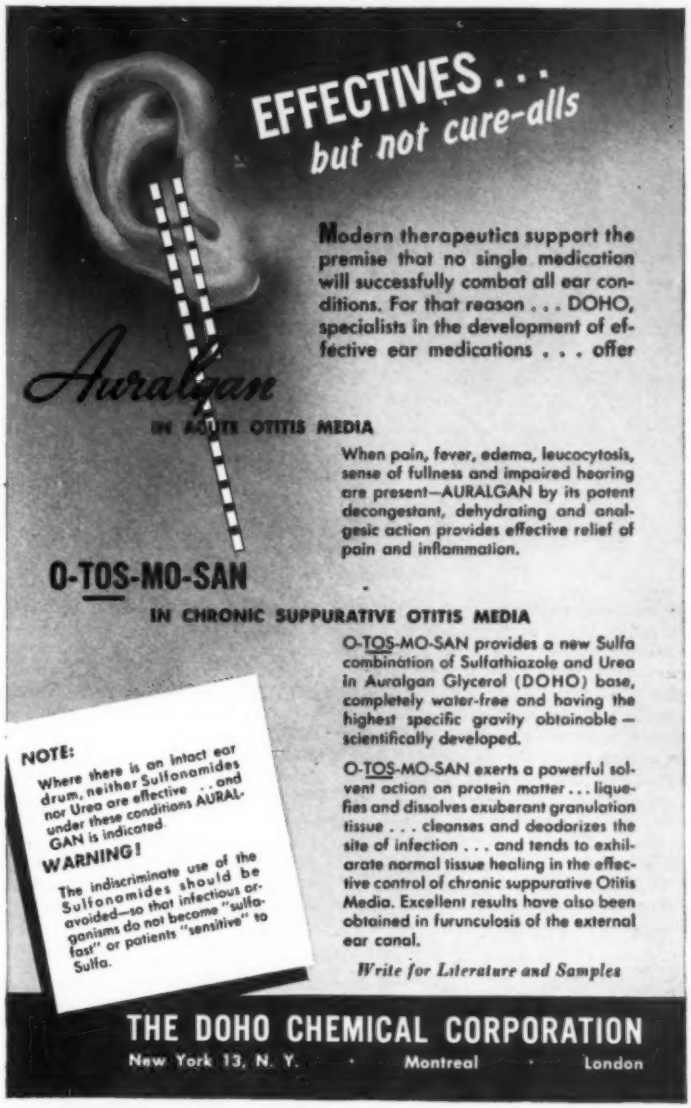
The manifest value of stereoscopic chest X-ray inspection of apparently healthy persons occasioned a provision, in 1922, whereby all of the 2,000 students in a Minneapolis high school were offered this service without charge. It was expected that chest lesions would be brought to light, and that physicians would then be convinced of the need for chest films of all apparently healthy adults. The school officials approved the survey; it was widely announced and encouraged. But unfortunately, the time was not ripe. The idea was belittled by many persons, including some physicians. Not enough educational work had been done to dispel the old prejudices or to convince physicians that X-ray inspection of the chest is more valuable in determining the location and extent of pulmonary lesions than any other procedure of the physical examination. Only a small number of the 2,000 students availed themselves of the opportunity Although the response was discouraging, enthusiasm was not dampened—nor could it have been by any amount of opposition. Evidence of the efficacy of this procedure continued to accrue.

The second special tuberculosis survey was begun in 1933, when an adequate examination of all employees for tuberculosis was made mandatory by the Minneapolis Board of Education. The examination consisted of a tuberculin test, X-ray film inspection of all reactors, and a complete follow-up of those who presented shadows that might have resulted from tuberculosis. X-ray films of the chest were required of those who had recently been tested with tuberculin and of those who refused the test. Had the examination been voluntary, some of the persons found to have clinical tuberculosis would not have been examined, as they were among those who strongly opposed the procedure on grounds of legality, personal liberty, and so forth. Of the 3,602 members of the personnel, only one, who resigned, escaped the examination; whereupon it was discovered that she had had known for several years that she had had infectious pulmonary tuberculosis. She had been employed to prepare food for high school students.

Other surveys, in recent years, have consisted in the administration of tuberculin tests to high school students and in the subsequent inspection by X-ray of those who accepted investigation, regardless of the tuberculin reaction. A recent survey of personnel of the school system consisted only of making chest films of those who volunteered, and free chest X-ray inspection has been offered in two or three districts of Minneapolis. In none of the recent surveys had the desired number of persons been reached.

The mass survey of school personnel in 1933 and 1934 has been the only satisfactory one to date: it reached everyone. This represents a goal that must be obtained, or nearly so, in any survey that is to be satisfactory. By adequate education and a suitable approach to all citizens, it can be attained.

The work among the 19,000 or so children and 10,000 adults, under observation between 1921 and 1941, and among the 50,000 or so students entering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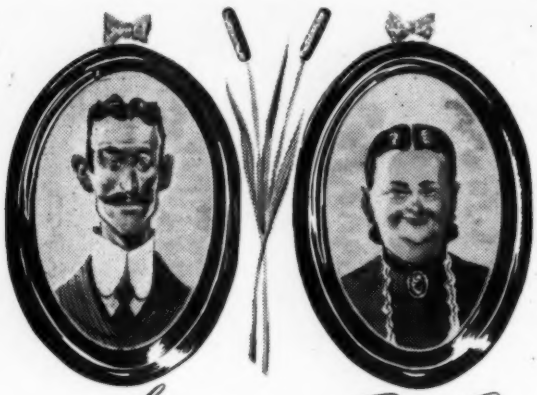

Sprat and Wife

Jack Sprat could eat no fat
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the University of Minnesota between 1928 and 1946, has constituted by far the best survey conducted in the city of Minneapolis. If the X-ray films of these thousands of persons were to be inspected without knowledge of the results of the work, the information derived would be meager. There would be no indication of how many, or of which ones, had primary lesions; and it would be impossible, even, to determine with accuracy which of these with gross lesions had tuberculosis. If the same observers, on the other hand, were to review the complete records—taking into consideration the results of tuberculin tests, X-ray films, and clinical and bacteriological examinations—they would form a true concept of the tuberculosis situation in the groups under observation from year to year.

Facts were established through this procedure that could not have resulted from any other. From 1921 to 1941, for example, 1,001 children were observed who reacted characteristically to tuberculin between birth and 5 years of age. Fourteen (1.38 percent) died from acute reinfection type of tuberculosis; six, from meningitis; five, from generalized miliary disease; and three, from tuberculous pneumonia. Thirteen others (1.29 percent), of whom none died, developed extrathoracic reinfection type of tuberculosis—e. g., bone and joint lesions. Hence, only 27, or 2.7 percent, developed significant clinical lesions in childhood. These observations indicate that at least in this community, infection with tubercle bacilli in infancy and early childhood is well tolerated.

Of 2,979 children, from 6 to 14 years of age, who reacted to tuberculin at the time of the first examination, none gave a history of illness or became ill from the primary lesions. During this age period, extrathoracic lesions of the reinfection type were already present or became demonstrable in 36 instances, and chronic pulmonary tuberculosis of the reinfection type were present in 30. The majority of chronic pulmonary lesions was found in those between the ages of 12 and 14.

Of the many persons observed in the Minneapolis work, more than one thousand adults—mostly students of nursing and medicine—have developed primary tuberculosis while under observation. They have tolerated the first infection type of tuberculosis as well as have those infected in childhood; and moreover, they have not developed, subsequently, significant chronic reinfection type of tuberculosis to a greater degree than those who entered the observation group as tuberculin reactors. The theory propounded in 1920, therefore—that a first infection postponed to adulthood is exceedingly hazardous—is untenable in Minneapolis. Effort to prevent children from becoming infected with tubercle bacilli is sound practice in tuberculosis control: the longer infection is postponed, the better—in the individual or in the community.

TREATMENT OF TUBERCULOSIS

When the studies on children were begun in 1921, practically no differentiation as to treatment was made between the first infection and the reinfection type of tuberculosis. The vast majority of diagnoses were made when symptoms caused persons to seek examination. They were mostly adults. Of those whose symptoms were found to be caused by tuberculosis, 80 to 90 percent had the disease in an advanced stage, and for the most part were infectious. When shadows of tuberculous lesions were seen in children and young adults who were apparently in excellent health and at the time, presented no other evidence except the tuberculin reaction, it was assumed that the majority of these lesions represented clinical disease that would progress, causing illness and death, if not promptly and adequately treated. In those days, treatment consisted largely of rest in bed, either in the home or in an institution. Artificial pneumothorax was not in general use in Minneapolis, and no one had been treated by chest surgery. As the years passed, the fact became apparent that all reactors to tuberculin have lesions of the primary type, determinable as to location in only a small percentage during life.

The Lymanhurst School for Tuberculous Children, with a capacity of 175, was recommended for those who were anemic, below weight, or who presented evidence of calcium deposits, etc. It was thought that special care in such an institution would aid in so controlling the lesions that they would be harmless in adulthood. A much larger number of

children with such conditions, who could not be accorded this privilege because of the limited capacity, served as controls. After the school had been in operation for 13 years, the data were analyzed. Surprisingly enough, the children who had remained at home with no treatment other than attempts to prevent exogenous reinfection had fared as well as those treated in the school.

Two hundred and twenty other children were observed while their primary tuberculosis was in the pneumonic or atelectatic stage. Sanatorium care was strongly recommended, despite the fact that the children were ostensibly in excellent health. Some families accepted this recommendation; others refused. To the latter, the Lymanhurst School was offered, but this was also declined by some. The children were thus divided into three groups: those who were treated in a sanatorium, those in a special school, and those who remained at home. An unusual opportunity was afforded to observe, under three different conditions, the course of the disease and the response to treatment.

No difference could be found among the lesions of the three groups when these children were later seen. Those who received strict bed rest had fared no better than those in the special school, who in turn showed no advantage over those who remained at home; the course of the disease was the same, whether little or much was done. In due time, all of the pneumonic and atelectatic lesions had so diminished in size that they could not be detected by X-ray film inspection. Often this required 2 or 3 years. In some cases, calcium deposits subsequently appeared at the site of a previous lesion, in the regional lymph nodes, or in both locations; while in others, the chests remained entirely clear. It was impossible, moreover, to observe any difference in the incidence of development of the reinfection type of tuberculosis among the three groups of children when they attained adulthood. Those who were treated, as children, in a sanatorium were just as likely to develop the reinfection type of disease in adult life as those who remained in their homes or in the special school.

Thus, the problem of treating children affected with primary tuberculosis—one that seemed of great magnitude at the start of the work—was found to be no problem at all. This was also true among the university students with primary tuberculosis, regardless of the stage of development of the disease. It was therefore recommended in 1933 that all aspects of treatment of the first-infection type of tuberculosis among children and young adults be discontinued—that the funds allocated for this purpose be used to test much larger numbers of children with tuberculin, in a search for the source of infection of the reactors, and to examine annually the chests of all reactors upon attainment of adulthood. Subsequent observation has resulted in no evidence to show that the primary type of tuberculosis, either in children or in adults, requires treatment. There are two important procedures, however, to be followed for everyone found by the tuberculin test to have tuberculosis, regardless of X-ray shadows: (1) prevent exogenous reinfection, and (2) examine annually all who have attained adulthood, including always X-ray film inspection of the chest.

In Minneapolis, experience in treating the reinfection type of pulmonary tuberculosis has been the direct opposite of that in treating the primary type. Although many persons recover spontaneously, the percentage in whom the reinfection type progresses to incapacitating and killing proportions is too high to permit taking the risk involved in not treating a given active lesion. Serious injustice could result from a recommendation of treatment for every lesion found on the first examination, as many of them, regardless of size, have long since been controlled by the body defense mechanism, and therefore require no treatment whatever. Unfortunately, this status usually cannot be determined except by an extended observation.

As age advances, there is an accrual of minimal lesions that have come under control. These may be of long standing. Hence, not all minimal lesions are early. And on the other hand, not all early lesions are minimal. Indeed, a considerable number of lesions are moderately or far advanced when first detectable.

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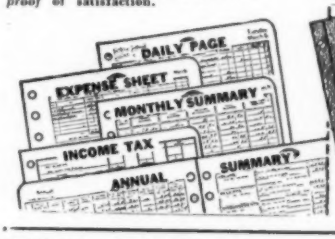

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and to treat them immediately has been a major objective in the Minneapolis work. Only in cases where evidence of infection is limited to the tuberculin reaction can we be sure that a given lesion is early. Only in such cases can there be a subsequent development of the reinfection type of tuberculosis. If these cases are reexamined at sufficiently close intervals (every 6 to 12 months), pulmonary lesions in those who develop them will be found relatively early, when the majority are minimal. A minority will be in an advanced stage. Such cases rarely have symptoms or are infectious when found, and frequently prompt and adequate treatment prevents them from falling ill or becoming contagious. For more than 20 years, such cases have been treated successfully in Minneapolis with ambulatory artificial pneumothorax. When this is not indicated because of extent of disease, temperament, or other reasons considered valid, hospitalization has been recommended as in all cases of active tuberculosis.

Every community should have a bed for each infectious case. Tuberculosis cannot be controlled if tubercle bacilli are allowed to disseminate in the home or community. The protest is often made that it is pointless to conduct tuberculosis surveys because beds are not available for the contagious cases found. This is intolerable. All infectious cases should be located, regardless of bed shortage. A statement of the actual number of beds needed is the strongest argument in requesting them. And moreover, while beds are being procured, at least partial isolation can be arranged for many persons in their homes. A considerable number can be rendered noninfectious by collapse therapy, particularly artificial pneumothorax.

It is believed that the most important factors in improving the tuberculosis situation among children and young adults in the Minneapolis area have been the prevention of cases of clinical tuberculosis from becoming infectious, the isolation of those who are infectious, and the eradication of tuberculosis from cattle.

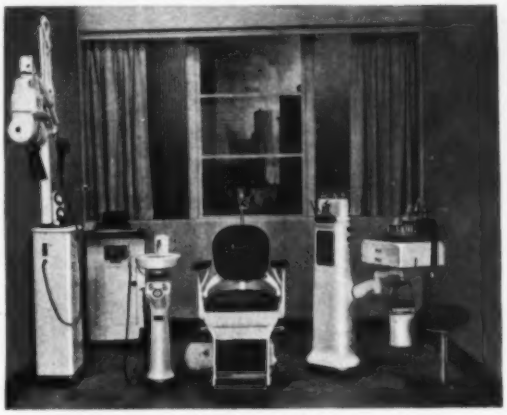
For several years the most troublesome problem has been among students of nursing and medicine. In one Minneapolis hospital, however, a very effective contagious-disease technique has been developed. The medical students have been protected against contagion to such a degree that the number of infections contracted while in school has been markedly reduced, and for more than 3 years not one case of clinical tuberculosis has developed among the students.

The tuberculosis-control program in the city of Minneapolis has developed slowly but constantly over the past quarter of a century. Every promising procedure that has been suggested anywhere in the world has been tried. Those found to be impractical or of little value have been discarded, and those that could be used to advantage, retained. Awkward and short-cut methods have been

discouraged. The results have been a decrease in morbidity, as attested by the fact that 750 beds were needed in the county sanatorium 12 years ago and that, at present there are 150 to 200 beds vacant; a decrease in the mortality rate, from 120 per 100,000 in 1920 to 27.1 in 1945; a decrease in the incidence of primary tuberculosis among grade school children, from nearly 50 percent in 1926 to approximately 8 percent in 1944; a contrasting annual infection attack rate among young children—3.5 percent in 1926 and 0.003 percent in 1944; and a decline in mortality among children up to 5 years of age, from a high rate in 1920-30 to not a single death from tuberculosis in 1945.

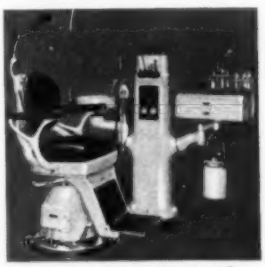
With a fundamental program of proved effectiveness, a complete solution of the tuberculosis problem in Minneapolis could be promptly achieved. That it is necessary to maintain a 3-million-dollar sanatorium costing three quarters of a million dollars a year to operate is absurd. In a single decade, the required number of sanatorium beds could be reduced to 100; the mortality rate, to less than 10 per 100,000. Children with primary tuberculosis, as manifested by the tuberculin reaction, would be almost curiosities. And within the second decade, tuberculosis could be reduced to the irreducible minimum. Present knowledge, equipment, and workers, combined with an intelligent public, are all that is needed to organize, to begin work, and to persevere.

Inexpensive X-ray inspection of the chest of each adult would reveal practically everyone who, at the time, has infectious tuberculosis. The number of such persons in Minneapolis would not be as large as many suspect—probably less than 300. With their removal to hospitals and sanatoria, some would be restored to good health, and infection removed from the city. The tuberculin test would then detect promptly all remaining persons with primary tuberculosis, of whom the total would probably not exceed a fourth of the entire population. The other three-fourths, as well as those who subsequently migrate to the city, should have the test at least every 2 years, and preferably annually. Those who react to tuberculin on first testing, and those who are later found to be reactors, should have thorough annual examinations, including X-ray inspection of the chest; and those who have developed the reinfection type of tuberculosis should be treated at once, and isolated in hospitals and sanatoria if the disease becomes infectious. The responsibility for those accomplishments lies with those in charge of the public health. Failure to achieve them—failure to control completely, and ultimately to eliminate tuberculosis—is unpardonable. —*Public Health Reports,* November 1, 1946.

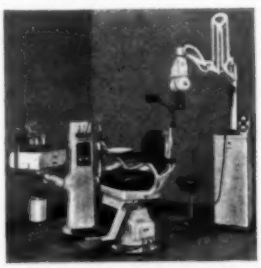


This Ritter Unit is for the physician who prefers to work with instruments and medicaments at right, Ritter Surgical Cuspidor at left of chair.

This Ritter Unit is positioned at left, with Surgical Cuspidor at right of chair.



This type of Ritter Unit, with Swinging Cuspidor, is positioned at right of chair.



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Physicians are invited to send for literature and clinical sample of both products

What's New with the Advertisers

MICRO MOVIES OF SOAP ACTION

To determine exactly what happens when human hair is washed with various soaps and other cleansing agents, the Research Department of the Procter and Gamble Co. recently made a series of photomicrographic motion pictures. No camera lens, as such, was employed in this work, the optical system used being that of a Bausch and Lomb microscope, which was teamed with a Filmo Auto Load 16 mm. motion picture camera operated at 16 and 24 frames per second.

Rapid and critical focusing upon a single hair was effected by means of the regular Bell and Howell Direct Focuser, and a special mechanical stage permitted "action" sequences to be filmed while various solutions were circulated around the hair inside a glass cell. Considerable advancement in the study of soap action is expected as a direct result of this reasearch, with ultimate benefit to the consumer.

NEW PREPARATION—CHOLANOX

Cholanox, a new preparation designed for safe and better medical management of biliary disease, has been developed by the Maltbie Chemical Company of Newark, N. J., which in 1940 developed the first American process for making dehydrocholic acid.

Cholanox is a combination of equal parts ketocholanic acid (90 per cent dehydrocholic acid) and purified, dehydrated whole bile (substantially the soduim salts of glycocholic and taurocholic acids, plus the complexes or coordination compounds of desoxycholic acid).

This grouping, according to the manufacturer, has decided advantages in that it produces a dual action: through its ketocholanic acids, cholanox stimulates a pronounced hydrocholeresis for flushing the biliary ducts; and its purified whole bile acts as a replacement in bile salts deficiencies, directly aiding intestinal digestion.

When used together with the appropriate dietary regimen and anti-spasmodic medication as required, the value of cholanox can be utilized to its fullest extent in the treatment of chronic cholecystitis, non-calculous cholangitis, biliary dyskinesia and post-operative treatment.

Administration of Cholanox may be adjusted to meet the needs of the particular patient. The usual dosage is one tablet taken three times a day either with or immediately after the meal. Because of the pronounced flow of bile, Cholanox should not be administered where there is occlusive mechanical obstruction. It should be used with caution in acute yellow atrophy, acute hepatitis, eclampsia and in progressive jaundice.

NEW PREPARATION—VERTAVIS

Vertavis, a new clinically tested agent for control of hypertension, is being introduced to the medical profession by Irwin, Neisler and Company, Decatur, Illinois. The product provides a biologically standardized veratrum viride, each tablet containing 10 Craw units of the whole powdered drug. They are put up in bottles containing 100, 500 and 1,000 tablets.

Clinical tests over a 2 year period indicate a very low incidence of side reactions, however mild, with substantial falls in blood pressure. The product has been given in doses six times that of minimum therapeutic requirements without severe toxic reactions. Vertavis produces a calm, gradual vasodilatation which is greatly prolonged providing the drug is given without interruption.

SULFONASOL

(Sulfadiazine Mixture "National")

The National Drug Company, Philadelphia, announces a new product, sulfonasol, especially recommended for infants and children, for adults who are medicine conscious, and for all who require a prolonged course of sulfonamide administration. The presence of microcrystaline sulfadiazine, one of the most valuable of the sulfonamide drugs, makes possible a broader therapeutic range of high bacteriostatic effectiveness. Sulfadiazine is also more advantageous than other sulfonamides from the standpoint of absorption, blood concentration and penetration into body fluids. This means that more dependable concentration levels are maintained.

Sulfonasol is a pleasant-tasting, aqueous mixture of microcrystalline sulfadiazine. Its outstanding palatability, inviting appearance and odor, and ease in administration make it the sulfonamide preparation of choice especially for

infants and children, and for medicine-conscious patients who refuse or stop taking medicines which offend their taste.

Sulfonasol contains in each fluid-ounce approximately 2 grams (31 grains) of microcrystalline sulfadiazine in a specially prepared vehicle with flavoring, sweeting and coloring agents.

Sulfonasol is indicated as an aid in the prevention and control of infections susceptible to the action of sulfadiazine and especially in those conditions caused by hemolytic streptococci, pneumococci, gonococci and meningococci.

Average dose: In children, the initial dose for pneumonia is 0.10 to 0.15 gm. of sulfadiazine per kilogram (2.2 lbs.) of body weight. Subsequent doses are ¼ of the initial dose given at intervals of 6 hours until the temperature has been normal for at least 48 hours. For other dosage, the physician will be guided by the fact that each tablespoonful (4 teaspoonfuls) of sulfonasol contains 1 gm. (15.4 grains) of microcrystalline sulfadiazine. The exact dosage of sulfadiazine for prophylaxis has not been fully determined. The following is suggested: For infants and children, 1 teaspoonful once or twice daily; for older children and adults, 2 teaspoonfuls twice daily.

CASTELLANI'S PAINT "RORER" NOW IN 1 OZ. APPLICATOR BOTTLES

William H. Rorer, Inc., Philadelphia, Pharmaceutical Manufacturers, announces that Castellani's Paint "Rorer" is now available in 1 oz. applicator bottles, convenient for the patient's use, as well as the regular 4 oz. bottles. This new package was developed in response to a widespread demand. Castellani's Paint has long been preferred by many physicians in the treatment of "athlete's feet," but has always been both unstable and troublesome to compound. Rorer research has now succeeded in making the preparation in stable form.

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Extracts

ATTITUDE OF AMERICANS

We Americans are quite certain that everything in this country is either the biggest or the best, or both. Almost every issue of *Life* magazine contains one or more pictures of scenes native to this country and described as the biggest or most beautiful or the busiest in the world. This is not only utter nonsense but a gross distortion of a sense of courtesy and the proper fitness of things. We do ourselves no good in our relations with others in constantly bragging of our superiority. This general attitude pervades American medicine. *The Journal of the American Medical Association* frequently cites the excellence of American medicine and its superiority over that of all other countries. That we are, in fact, superior is open to question. Of the great men of medicine certainly far more have come from England and Europe (admittedly, particularly in the past). Although this might be due to our younger culture, or for whatever reason, we should not be blinded by narrow provincialism, as we now are, and we should concede, if need be, that others are as good, or even better, than we. And if we are superior we should have the good grace not to talk about it. It is this generalized edema of the ego which contributes to a lot of nonsense now put out about our schools, and we must return to a more sane outlook and broader, impartial view if our schools are to be made better. — Edmund E. Simpson, *Journal of the Association of American Medical Colleges*, September 1946.

CHARTER FOR WORLD HEALTH [1]

By *Thomas Parran*, Surgeon General, United States Public Health Service, and President, International Health Conference

This has been an historic international health conference. Its success equals that of any comparable international gathering. This has been due to the outstanding ability of you, the delegates, who are the leaders of the world in public health and medicine, and to the professional atmosphere and spirit of cooperation which has marked this month of arduous work.

The foundation of our work was laid by the Economic and Social Council last

[1] Delivered at the signing of the Charter of The World Health Organization, Henry Hudson Hotel, New York City, July 22, 1946.

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February in calling the conference, and by the constructive work of its Preparatory Committee of Experts in Paris. It has been greatly aided by the excellence of the Secretariat which the United Nations has provided. To the Council, the Preparatory Committee, and the Secretariat we express our deep appreciation.

The nations represented here today are signing a Magna Carta for health, which will bring into being a world health organization unique in its scope, authority, and functions. Its broad purpose is the attainment by all peoples of the highest possible level of health and well-being. We are convinced that health is not merely the absence of disease or infirmity but a state of complete physical, mental, and social well-being, the enjoyment of which we declare to be a fundamental right of every human being without distinction of race, religion, political belief, economic or social condition. We believe its attainment is essential for peace and security.

It is becoming clear that the health sciences can contribute to man's ability to live harmoniously in a changing total environment. Thus, improved health enhances standards of living, promotes economic prosperity, and contributes to our total objective, which is peace. The fundamental freedoms can be realized only when people are healthy and well nourished.

In the field of health, nations are interdependent. Epidemics anywhere in the world are dangerous to other nations. Low standards of health lay a burden upon prosperity and trade, imposing an economic handicap on every nation and on the world as a whole.

While the responsibility for health within its own borders is of primary concern to each nation, the success of each can be greatly enhanced through international teamwork. The world health center we are creating, therefore, should be the directing and coordinating agency to provide information, leadership, and assistance in every phase of health work. Not only will the organization aid in disseminating and applying all of the scientific knowledge we now possess to prevent disease and promote health but it will encourage and conduct scientific research to forge more effective tools to control disease. Better remedies will be discovered. New preventives will be found. As a result, there will be brought under better control many of the human ills which now take such a large toll in disability and death. Cancer, heart disease, mental illness, and degenerative diseases, for example, are obvious targets for such international scientific endeavor.

Public health is a dynamic composite of many scientific disciplines. Through their application the average life span in the more advanced countries has been doubled during the past century. Yet, progress has been very uneven in the different nations. In some countries, for example, one-half of all children born do not reach 5 years of age. The average life span is about half of that attained in the more fortunate nations.

Recently we have seen the miracles which can be accomplished by the sulfa drugs and penicillin, yet only a small proportion of the world's population has access to those remedies. For a large part of the world's people doctors and hospitals, in the modern sense, are virtually unknown. Even such an elementary requirement for health as an uncontaminated water supply is lacking over large areas of the earth.

To achieve the great objectives of the World Health Organization will require our best, our most persistent, efforts. But our efforts alone are not enough. We must bring to the rank and file of mankind—to the common man everywhere—an understanding and appreciation of the elements of health, and a consuming desire to achieve it. Without this our signatures on a document here in New York will have little meaning. The World Health Organization, therefore, must be built for human service, must give practical help to the world's people, must undertake first things first.

During the past 40 years our nations have acquired some experience in international health action, first through efforts to prevent, through quarantine and through exchange of epidemic intelligence, pestilential disease from spreading between nations. During the years between the two world wars those efforts were broadened to include mutual help in disease control, in training of health personnel, in gathering valuable statistics, and in standardization of certain drugs and biologic products. During the war the United Nations pooled fully their military efforts to prevent disease. All of this experience will be useful to us in our tasks ahead.

The World Health Organization will be prepared to use all of our most modern scientific knowledge, our best tools, wherever needed to help heal the wounds of war and to eliminate the ancient human plagues, such as malaria and cholera, tuberculosis, and syphilis. Prevention of disease is a first objective. But this is only a first stop. Hunger and malnutrition stunt the bodies and warp the minds of a large part of the world's population. To attain freedom from want of food is another goal which we may hope to reach by pooling our nutritional knowledge with the food and agricultural efforts of the United Nations.

A next step toward world health is the positive improvement of health—of physical and mental fitness. Higher levels of physical development, a longer, more productive, more vigorous life span will be sought and attained.

To help reach these goals we need not only to apply all the knowledge we now have for prevention, treatment, and control of disease everywhere in the world, but we need to conduct intensive research in the laboratory, at the bedside, and in the field to push back the frontiers of the unknown in the health sciences.

The several, measurable, scientific objectives are difficult, but not impossible of attainment. Yet at our Conference the practical scientists have not been content to stop at this point. We have an additional task.

Humane plans for health go for naught unless the peoples of the world can learn to live together in peace. Never again can our world disintegrate into the insanity of another total war.

Public health experts realize that science may be used either to save life or to destroy civilization. Whether science is to be used for good or for evil is not determined by scientists themselves. The same type of research worker may discover penicillin or atomic fission. It is the mass conscience of mankind—the dominance of the moral or the amoral — which determines whether research is to be used for life or death.

In our Magna Carta for health we have ventured to declare that we have a contribution to make to the central world problem of our day, which is to help man learn to live harmoniously with his fellow man. In making this proposition I, for one, believe that health science must share the task with religion and education.

The science of mental hygiene is one of our newer disciplines, concerned with the human mind and emotions. Even in its present early stage of development, it helps man adjust to his environment, to live in greater harmony with his family, his community, his world. This science of mental hygiene needs urgently to be developed and applied as a basic element in preventing war and destroying the seeds of war.

The World Health Organization is, therefore, a collective instrument which

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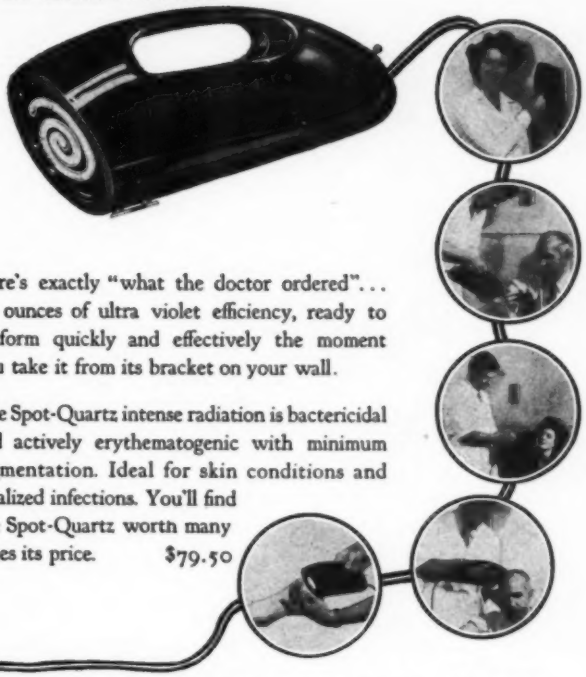

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will promote physical and mental vigor, prevent and control disease, expand scientific health knowledge, and contribute to the harmony of human relations. In short, it is a powerful instrument forged for peace.

We return to our homes knowing that we have done our best. We hope that history will record a job well done. —*Public Health Reports*, August 30, 1946.

PRICE OF CARE PACKAGES REDUCED ONE-THIRD

General William N. Haskell, Executive Director of Care (Cooperative for American Remittances to Europe, 50 Broad Street, New York 4) reports that the price of the standard Care package has been reduced from $15 to $10. This food package was originally designed by the Quartermaster Corps of the U. S. Army. It provides 40,000 calories of fine highest quality American food that was designed to maintain adequately an American soldier under combat conditions for 10 days. One package can supplement present rations for one person for 50 days. Weighing 49 pounds in a waterproof container, it contains approximately 29 pounds of solid food already cooked and easily prepared and includes such additional items as can opener, soap, matches and other vitally needed supplies.

Says General Haskell, "We who work with Care are anxious that all Americans know how they may share the plenty of this country with suffering people abroad, especially at the Christmas season when gifts of food will go a long way to assure our neighbors overseas of our concern for them. We ask your help in spreading that message."

Books Received

OPERATIVE GYNECOLOGY. By Richard W. Te Linde, M.D., Professor of Gynecology, John Hopkins University, and Chief Gynecologist, John Hopkins Hospital. Cloth. Pp. 751, with illustrations. Price $18.00. J. B. Lippincott Company, 227 S. Sixth Street, Philadelphia, 1946.

MEDICAL USES OF SOAP. Edited by Morris Fishbein, M.D. Cloth. Pp. 195, with 41 illustrations. Price $3.00. J. B. Lippincott Company, 227 S. Sixth Street, Philadelphia, 1946.

THEIR MOTHERS' SONS. By Edward A. Strecker, A.M., M.D., Sc.D., Litt.D., LL.D. Cloth. Pp. 220. Price $2.75. J. B. Lippincott Company, 227 S. Sixth Street, Philadelphia, 1946.

CONDUCTION ANESTHESIA. By George P. Pitkin, M.D., F.A.C.S., F.I.C.A. Edited by James L. Southworth, M.D., and Robert A. Hingson, M.D. Cloth. Pp. 681, with illustrations. Price $18.00. J. B. Lippincott Company, 227 S. Sixth Street, Philadelphia, 1946.

THE SECOND FORTY YEARS. By Edward J. Stieglitz, M.S., M.D., F.A.C.P. Cloth. Pp. 317, with illustrations. Price $2.95. J. B. Lippincott Company, East Washington Square, Philadelphia, 1946.

WHITE CAPS: The Story of Nursing. By Victor Robinson, M.D., Professor of History of Medicine, Temple University School of Medicine, Philadelphia; Lecturer on History of Nursing, Temple University School of Nursing. Cloth. Pp. 425, with illustrations. Price $3.75. J. B. Lippincott Company, 227 South Sixth Street, Philadelphia, 1946.

RISK APPRAISAL. By Harry Dingman, Vice President and Medical Director Continental Assurance Company, Author Insurability Selection of Risks, Contributor, Medical Diagnosis, Etc., Etc. Cloth. Pp. 824, with illustrations. Price $10.00. The National Underwriter Company, Cincinnati, Ohio, 1946.

VICTORY OVER PAIN: A History of Anesthesia. By Victor Robinson, M.D. Cloth. Pp. 338, with illustrations. Price $3.50. Henry Schuman, 20 East 70th Street, New York 21, 1946.

THE DIAGNOSIS AND TREATMENT OF BRONCHIAL ASTHMA. By Leslie N. Gay, Ph.B., M.D., Assistant Professor of Medicine of the Johns Hopkins University School of Medicine. Director of the Allergy Clinic of the Johns Hopkins Hospital. Cloth. Pp 334, with illustrations. Price $5.00. Williams & Wilkins Company, Mt. Royal and Guilford Aves., Baltimore, 1946.

HYGIENE. By Florence L. Meredith, B.Sc., M.D., Fellow of the American Medical, American Public Health, and American Psychiatric Associations; Professor of Hygiene and Public Health, Tufts College. Ed. 4. Cloth. Pp. 838, with illustrations. Price $4.00. The Blakiston Company, 1012 Walnut Street, Philadelphia, 1946.

PRINCIPLES OF HEMATOLOGY. By Russell L. Haden, M.A., M.D., Chief of the Medical Division of the Cleveland Clinic, Cleveland, Ohio; Formerly Professor of Experimental Medicine in the University of Kansas School of Medicine, Kansas City, Kansas. Ed. 3, revised. Cloth. Pp. 366, with illustrations. Price $5.00. Lea & Febiger, Washington Square, Philadelphia, 1946.

MONGOLISM AND CRETINISM. By Clemens E. Benda, M.D., Director, Wallace Research Laboratory for the Study of Mental Deficiency, Wrentham, Mass., Instructor in Neuropathology, Harvard Medical School, Assistant in Psychiatry, Massachusetts General Hospital, Lecturer, Postgraduate Seminar, Massachusetts Department of Mental Health. Cloth. Pp. 310, with illustrations. Price $6.50. Grune & Stratton, Inc., 443 Fourth Avenue, New York, 1946.

NEW GOALS FOR OLD AGE. Edited by George Lawton. Third printing. Cloth. Pp. 210. Price $2.75. Columbia University Press, Morningside Hts., New York City, 1945.

X-RAYS AND RADIUM IN THE TREATMENT OF DISEASES OF THE SKIN. George M. MacKee, M.D., Professor of Clinical Dermatology and Director of Department of Dermatology (Skin and Cancer Unit), New York Post-Graduate Medical School and Hospital, Columbia University; and Anthony C. Cipollaro, M.D., Assistant Professor of Dermatology (Skin and Cancer Unit), New York Post-Graduate Medical School and Hospital, Columbia University. Ed. 4, thoroughly revised. Cloth. Pp. 668, with illustrations. Lea & Febiger, Washington Sq., Philadelphia, Pa., 1946.

SEX, MARRIAGE AND FAMILY. By Thurman B. Rice, A.M., M.D., Professor of Bacteriology and Public Health, Indiana University School of Medicine; State Health Commissioner of Indiana (formerly); Author of "Sex Education Series," American Medical Association; Chairman of Joint Committee on Health Education of National Educational Association and the American Medical Association. Cloth. Pp. 271. J. B. Lippincott Co., 227 S. Sixth St., Philadelphia, Pa., 1946.

DIAGNOSTIC EXAMINATION OF THE EYE. By Conrad Berens, M.D., F.A.C.S., Professor of Clinical Ophthalmology, Columbia University; Executive Eye Surgeon, New York Eye and Ear Infirmary; Formerly Chairman, Section on Ophthalmology of the American Medical Association; Managing Director, The Ophthalmological Foundation, Inc.; etc.; and Joshua Zuckerman, B.Sc., M.D., C.M., F.A.C.S., Instructor in Ophthalmology, New York University; Instructor in Ophthalmology, New York Eye and Ear Infirmary and Columbia University Postgraduate School; Ophthalmic Surgeon, Midtown Hospital; etc. Cloth. Pp. 711, with illustrations. Price $15.00. J. B. Lippincott Co., 227 S. Sixth St., Philadelphia, Pa., 1946.

THE NORMAL ENCEPHALOGRAM. By Leo M. Davidoff, M.D., Professor of Clinical Neurological Surgery in the College of Physicians and Surgeons, Columbia University; Attending Neurological Surgeon to the Montefiore Hospital, New York City; and Cornelius G. Dyke, M.D., Late Associate Professor of Radiology in the College of Physicians and Surgeons, Columbia University; Late Director, in the Department of Radiology of the Neurological Institute of New York, New York City. Ed. 2, thoroughly revised. Cloth. Pp. 232, with illustrations. Price $5.50. Lea & Febiger, Washington Sq., Philadelphia, Pa., 1946.

THE TREATMENT OF BRONCHIAL ASTHMA. By Vincent J. Derbes, M.D., Instructor in Medicine and in Preventive Medicine, Tulane University of Louisiana School of Medicine; Assistant Visiting Physician, Charity Hospital of Louisiana; Director of the Department of Allergy, Ochsner Clinic; and Hugo Tristram Engelhardt, M.D., F.A.C.P., Instructor in Clinical Medicine, Baylor University College of Medicine, Houston, Texas; Physician, Humble Oil and Refining Company, Houston, Texas; Adjunct in Medicine, Jefferson Davis Hospital, Houston, Texas, etc. Cloth. Pp. 466, with illustrations. Price $8.00. J. B. Lippincott Co., 227 S. Sixth St., Philadelphia, Pa., 1946.

PENICILLIN—ITS PRACTICAL APPLICATION. Edited by Professor Sir Alexander Fleming, M.B., B.S., F.R.C.P., F.R.C.S., F.R.S., Professor of Bacteriology in the University of London, St. Mary's Hospital, London. Cloth. Pp. 380, with illustrations. Price $7.00. Blakiston Co., 1012 Walnut St., Philadelphia, Pa., 1946.

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Boudette, Wesley V., from 26 Fifth St., to Bangor Osteopathic Hospital, 292 State St., Bangor, Maine.
Boyd, Gail D., from Des Moines, Iowa, to Box 145, Manilla, Iowa
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Briscoe, Richard W., from Fort Worth, Texas, to Dublin Hospital, Dublin, Texas
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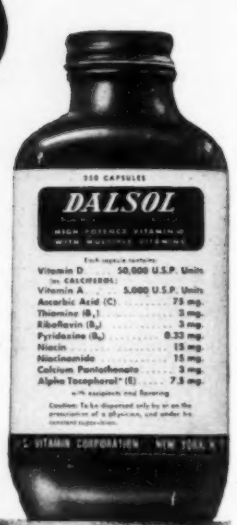

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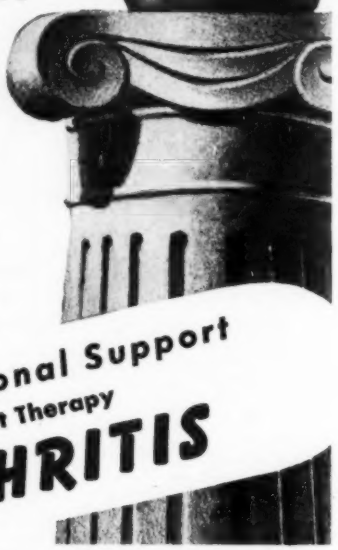

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Giffen, Larry E., from Jefferson City, Mo., to Chamois, Mo.

Goldstein, Martin J., from 4511 12th Ave., to 4711 12th Ave., Brooklyn 19, N. Y.

Goodkin, Reuben J., from 6131 E. Gage Ave., to 6837 Eastern Ave., Bell Gardens, Calif.

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Grod, Leonard N., from Uniontown, Kans., to Box 644, Hobart, Okla.

Hacker, C. Earl, from West Pembroke, Maine, to Armada, Mich.

Hartwell, Elbert E., from 1339 Colonial Circle, to Box 2424, Salt Lake City 14, Utah

Heilemann, J. George, from 62 Marshall St., to 122 Division St., Coldwater, Mich.

Hixson, Heber, from Chattanooga, Tenn., to 2105 Independence Ave., Kansas City 1, Mo. ●

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Huey, O. L., from Jasonville, Ind., to Maysville, Okla.

Huetson, Ward L., from 209 N. Cedar, to Ellis-Huetson Clinic, Denton, Texas

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Isett, F. Gerald, from Oakland, Calif., to 108 El Tejon Ave., Oildale, Calif.

Jamison, W. Dale, from Saginaw, Mich., to 102-04 W. McDowell Road, Phoenix, Ariz.

Jones, Harold S., KC '46; 42 Hillcrest St, Auburn, Maine.

Kaelber, Charles R., from Tacoma, Wash., to 837 E. Colvin St., Syracuse 10, N. Y.

Keig, Eugene R., from Mason, W. Va., to 725 Sixth Ave., Des Moines 9, Iowa

Kimball, John T., CCO '45; Massachusetts Osteopathic Hospital, 43 Evergreen St., Jamaica Plain Station, Boston 30, Mass.

King, Nelson D., from Belmont, Mass., to 358 Commonwealth Ave., Boston 15, Mass.

Kirkpatrick, Hugh T., from 312 Lynch Bldg., to 1432 Pearl St., Jacksonville 6, Fla.

Kitting, Robert C., from Belleville, Pa., to Pearl & Logan Sts., Reedsville, Pa.

Koffman, Joseph F., KC '46; Riverside Osteopathic Hospital, Trenton, Mich.

Krawczuk, A. B., from 9223 T S U-T C, Camp Shanks, New York, N. Y., to 728 S. Main St., Greensburg, Pa. (Released from service)

Kull, Ralph A. O., from Manchester, Iowa, to Winnsboro Hospital & Clinic, Winnsboro, Texas

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Lawrence, Winston E., from Box 702, to State Savings Bank Bldg., Frankfort, Mich.

Little, A. J., from 501 Lake Ave., to First Natl. Bank Bldg., Lake and J Sts., Lake Worth, Fla.

Luebbers, Eugene J., from Mondamin, Iowa, to 802 Durant St., Harlan, Iowa

MacDonald, Ernest R., from Riva, Md., to 411 Professional Bldg., 330 N. Charles St., Baltimore 1, Md.

Mack, Donald L., from 126 George St., to 165 George St., Trenton, Mich.

Magnall, James G., from Seal Beach, Calif., to 5712 E. Second St., Long Beach 3, Calif.

Mannarelli, J. E., from Ceredo, W. Va., to Box 27, Kirksville, Mo.

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Marjan, George F., CCO '45; 5400 S. Greenwood Ave., Chicago 15, Ill.

Markle, Raymond G., from New Haven, Mich., to 14 South Ave., Mount Clemens, Mich.

McCartney, Charles W., from 620 Bennington Ave., to 3800 E. 27th St., Kansas City 1, Mo.

McCullough, Robert D., from 303 Palace Bldg., to 614 S. Main St., Tulsa 3, Okla.

McGill, Richard O., from Hot Springs, N. Mex., to 125 W. McDowell Road, Phoenix, Ariz.

McLaughlin, Charles E., from 258 Madison Ave., S. E., to 634 Bridge St., N. W., Grand Rapids 4, Mich. (Released from service)

McLaughlin, Robert J., from Hobbs, N. Mex., to Box 14, Loving, N. Mex.

Meyer, O. R., Jr., from Wayzata, Minn., to First State Bank, Blanchard, Okla.

Meyer, Sherman W., from Hot Springs, N. Mex., to 125 W. McDowell Road, Phoenix, Ariz.

Miller, Bertha L., from 15 Myrtle St., to 319 State St., Springfield 5, Mass.

Miller, Waldo B., from 26 Fifth St., to Bangor Osteopathic Hospital, 292 State St., Bangor, Maine

Moots, Glen E., KCOS '46; C.V.O. Hospital, Yale, Okla.

Morse, Edwin E., from Belfast, Maine, to 142 High St., Portland 3, Maine

Mucie, Richard P., from 6226 E. 15th St., to 1924 E. 31st St., Kansas City 3, Mo. (Name changed from Mucci)

Muecke, Charles F., from Station Hospital, Will Rogers Field, Oklahoma City, Okla., to 112 Avenue B., W., Kingman, Kans. (Released from service)

Myer, Harry L., KCOS '46; Mason Clinic, Mason, W. Va.

O'Meara, Mary, from Pasadena, Calif., to Bayview, Idaho

Orman, John W., from 610-12 Palace Bldg., to 616 S. Main St., Tulsa 5, Okla.

Overton, Lavonne E., from Des Moines, Iowa, to 675 W. Broadway, Eugene, Ore.

Packer, C. R., from Dancer Bldg., to Duncan Drug Bldg., Boswell, Okla.

Peace, Arline S., DMS '46; Redfield, Iowa

Pearson, Karl M., from 208 Huron Bldg., to 709 N. Eighth St., Kansas City 9, Kans.

Perry, Donald G., from Standish, Maine, to 523 Florida Natl. Bank Bldg., St. Petersburg 5, Fla.

Purinton, Robert F., from Ottawa, Ill., to 25 E. Washington St., Chicago 2, Ill.

Rankin, William C., from Cadiz, Ohio, to Marietta Osteopathic Hospital, Inc., 304 Putnam St., Marietta, Ohio

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Roberts, Newal J., from Goshen, Ind., to 213 Major Laing Bldg., 116½ S. Main St., Mishawaka, Ind.

Robertson, Joseph C., from Marietta, Ohio, to Smithfield, W. Va.

Rogers, H. M., from Medical Det., 147th Infantry, APO 502, San Francisco, Calif., to 316 North St., Peoria 5, Ill. (Released from service)

Rosen, Samuel, from Arapahoe, Nebr., to 853 Central, Superior, Nebr.

Rosich, Edward J., from Engadine, Mich., to Baraga, Mich.

Sauter, John G., from Philadelphia, Pa., to 5214 Landis Ave., Sea Isle City, N. J.

Saxon, Harvey, from Plymouth, Ind., to 25 N. Sixth St., Stroudsburg, Pa.

Schultz, Patricia E., from Oklahoma City, Okla., to Box 487, Kirksville, Mo.

Schwaiger, Ernest P., from Winnsboro, Texas, to De Kalb Clinic, De Kalb, Texas

Scully, William F., Jr., from 26 Fifth St., to 46 Madison St., Bangor, Maine

Sechrist, Howard, from 25444 Fenkell St., to 25550 Fenkell St., Detroit 23, Mich.

Shaffer, Harold A., from 1615 Admiral Blvd., to Osteopathic Hospital of Kansas City, 926 E. 11th St., Kansas City 6, Mo.
Sheldon, Robert H., from Detroit, Mich., to 244 W. Jefferson Ave., Trenton, Mich.
Sinnett, John J., Jr., from Alfred, Maine, to 104 High St., Belfast, Maine
Smith, J. Louise, from Detroit, Mich., to 531 Plymouth St., Missoula, Mont.
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Stewart, Leslie B., from Plattsburg, N. Y., to Jackson Osteopathic Hospital, 121 Seymour Ave., Jackson, Mich.
Still, Charles E., Jr., from 6116 Northwest Highway, to 5962 Northwest Highway, Dallas 5, Texas
Stram, Harold M., from Los Angeles, Calif., to 2783 Mitchell Ave., Oroville, Calif.
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Taylor, Samuel E., from Glendale, Calif., to 102-04 W. McDowell Road, Phoenix, Ariz.
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Trimble, Foy, from Lover's Lane, to 203 Kirkpatrick Bldg., St. Joseph 8, Mo. (Released from service)
Valentine, Ernest F., Pvt., from North Hollywood, Calif., to Company C, 71st Battalion, E.T.C., North Fort Lewis, Wash. (New in service)
Walker, Arnold E. T., from 414 Maple Blvd., to 627 Newton Ave., Kansas City 3, Mo.
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Warden, Robert M., from 58 W. Main St., to 89 Main St., Ellsworth, Maine
Wellman, William J., from Detroit, Mich., to Box 116, Montgomery City, Mo.
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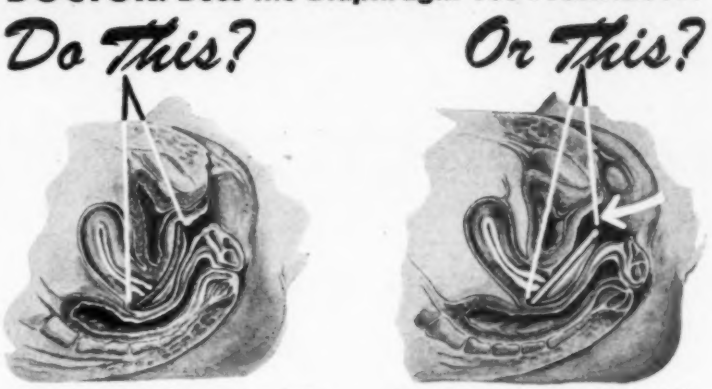

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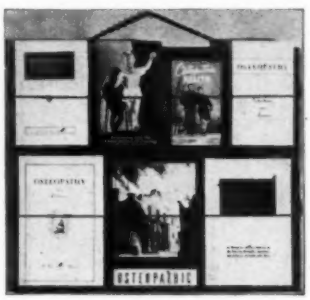

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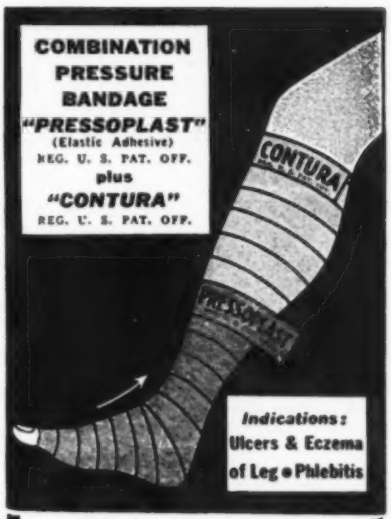

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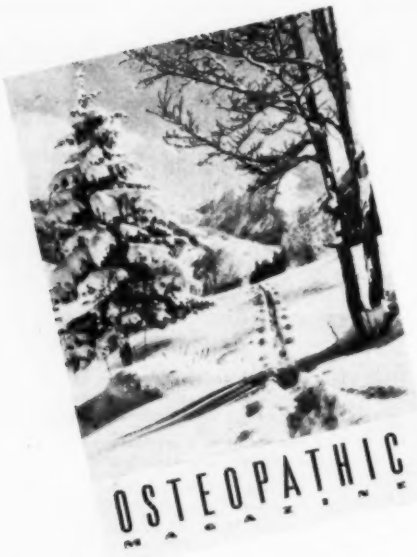

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If pressed for time, let Central office do your addressing and mailing at a small additional cost.

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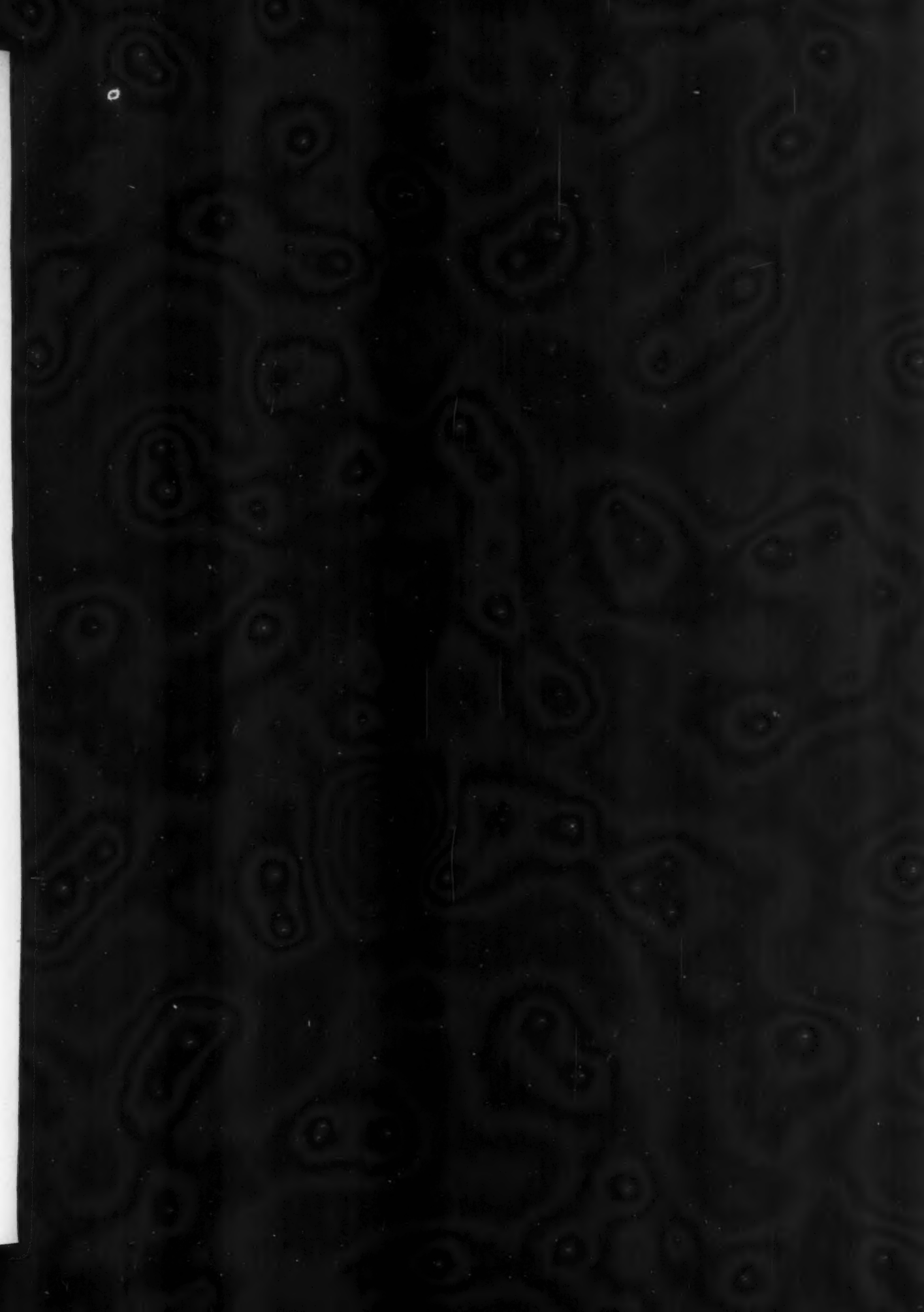

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*Greenhill, J. P., Am. J. Obst. & Gyn. 44:475, Sept. 1942.

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